THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXII. No. 802.] LONDON, SEPTEMBER 24, 1878. [30th Year.] Price 6d.

GAS PURIFICATION
BY
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26, 27, & 28, FENCHURCH ST.,
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SPENT OXIDE PURCHASED IN ANY QUANTITY.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used in over 200 Country Gas-Works, and by all the London Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
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WOOD GRIDS
FOR
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BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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WET AND DRY GAS-METERS,
LICENSEES AND MANUFACTURERS OF
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PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
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TELESCOPIC & SINGLE GASHOLDERS,
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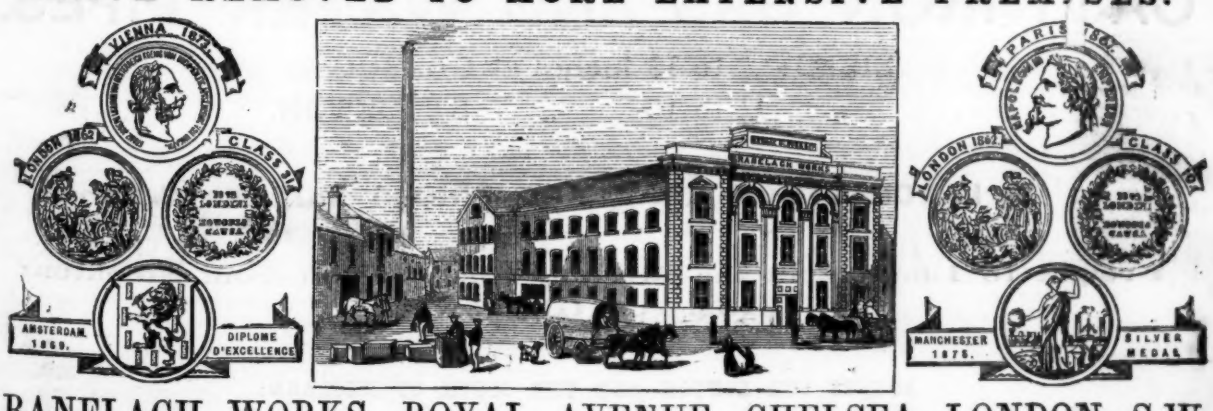

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SIZES: ¾ to 12 inches at GLASGOW.
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Freight to London, in the Stream, 10s. per ton from Stockton; 15s. from Glasgow.

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This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

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Sixteen now in course of erection at Beckton, applied to Covers 30 feet square.

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IN SUCCESSFUL OPERATION AT THE NEW WORKS OF THE NEWCASTLE AND GATESHEAD GAS COMPANY.

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WEST'S GAS IMPROVEMENT COMPANY,

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ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

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GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

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THE
STANDARD WASHER AND SCRUBBER.
[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

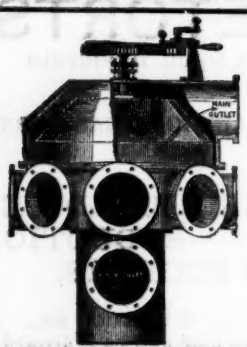
Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.
Unerring Regularity in the Distribution of the Liquor.
Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.
Economy of Space, thus enabling the Apparatus to be protected from the Weather.
Economy of First Cost and of Maintenance.
It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

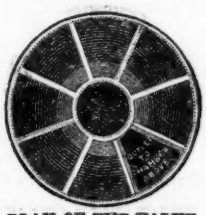
Applications for Prices, &c., to be made to

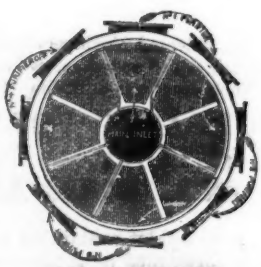
Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.


PLAN OF THE VALVE.


PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

EDWARD COCKEY & SONS,
GAS ENGINEERS, FROME SELWOOD,
MANUFACTURERS OF ALL DESCRIPTIONS OF
APPARATUS CONNECTED WITH GAS-WORKS.
THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE
DRY-FACED VALVES
FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

GEORGE ORME & CO.,

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LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

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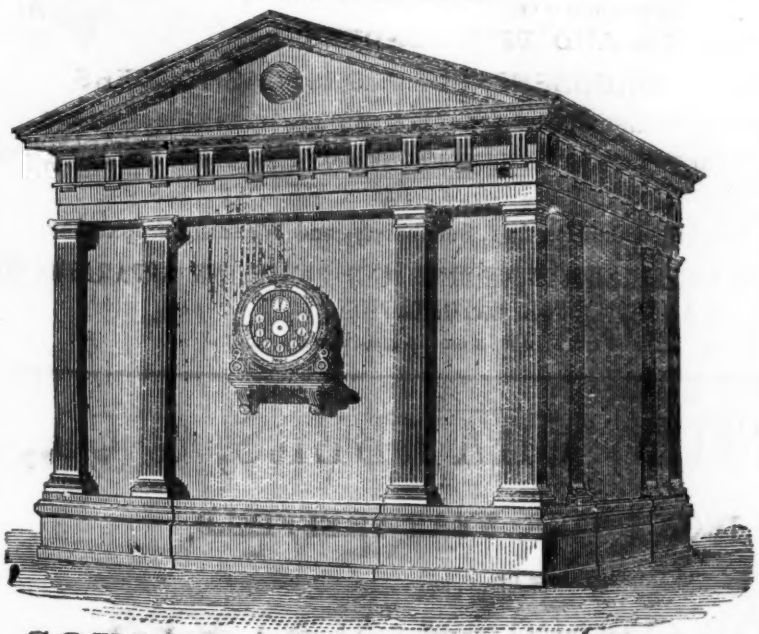
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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ESTABLISHED IN 1860.

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WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

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WOOD SIEVES,

WITH TAPER BARS,

MADE BY MACHINERY

CAPABLE OF MAKING 10,000 FEET WEEKLY.

References to Hundreds of First-Class Engineers.

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CONSULTING GAS ENGINEER

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CANNEL COAL FACTOR,

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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GRIRDROD'S PATENT

PORTABLE PIPE SCREWING

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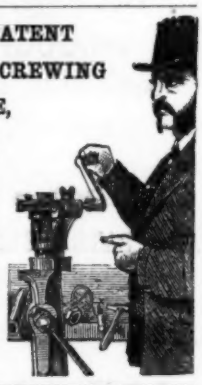

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

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STEEL OF ALL DESCRIPTIONS,

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GOLD MEDAL, PARIS, 1867,

The only Gold Medal awarded for "Apparatus and Processes for Heating and Lighting" by the Imperial Commissioners.

MEDAL FOR PROGRESS, VIENNA, 1873.

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TUBE AND WIRE,

ROLLED METALS, LOCOMOTIVE AND CONDENSER TUBES, CYLINDERS;

Ornamental, Taper, and Cased Tubes;

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GAS-FITTINGS, CHANDELIERS,

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Ecclesiastical and Mediæval Metal Workers.

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W. C. HOLMES & CO.,

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WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS, GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

TANGYE BROTHERS AND HOLMAN,

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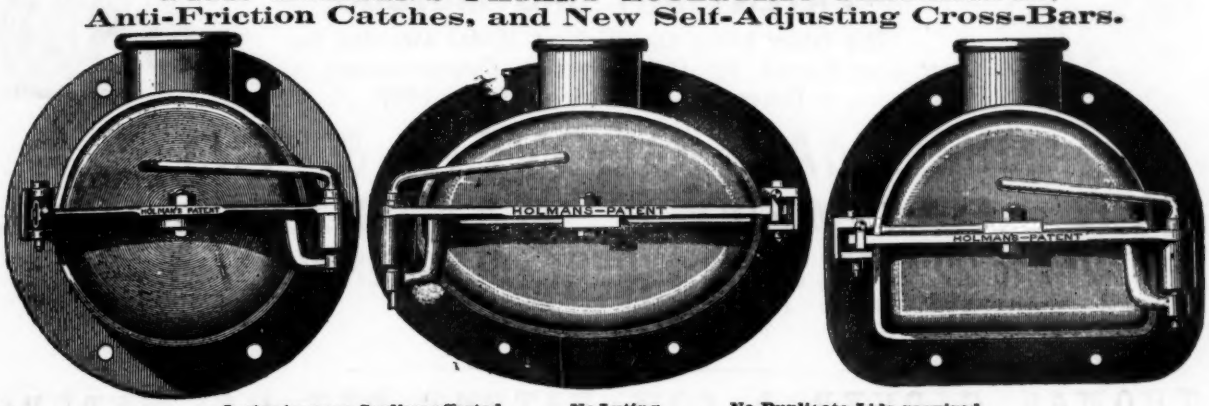
(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

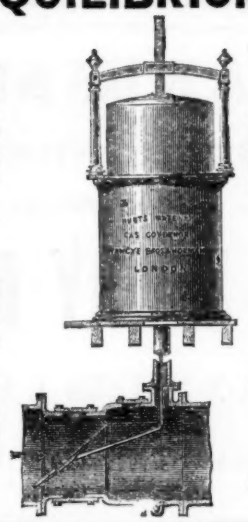
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1878.

MESSRS. TANGYE BROTHERS AND HOLMAN.

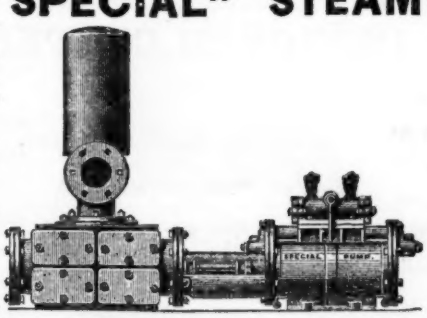
Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

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Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

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FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

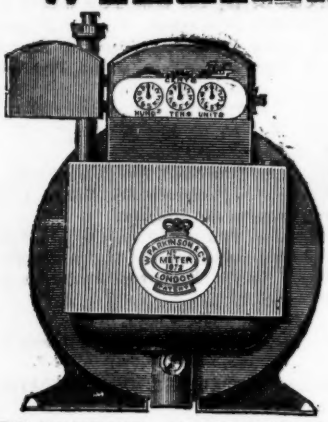
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do:
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

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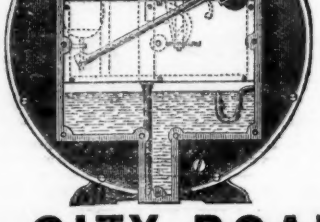
HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

CONTENTS.

Circular to Gas Companies:— PAGE
The Gas Legislation of 1878 . . . 449
The Electric Light . . . 449
Report of the South Metropolitan Gas Company . . . 449
Half-Yearly Meeting of the Crystal Palace Gas Company . . . 449
Half-Yearly Meeting of the Bristol Gas Company . . . 450
Report of the Aldershot Gas and Water Company . . . 450
Carping Critics at Birmingham . . . 450
The Purchase of the Ilkeston Gas-Works . . . 450
The Gas Profits of the Manchester Corporation . . . 450
A Gas Dispute at Torquay . . . 450
The Cost of Coal and the Price of Gas . . . 450
Water and Sanitary Notes:—
Drowned or Poisoned? . . . 450
Aldershot Water Supply . . . 450
The Water Supply of Abingdon . . . 450
Sanitary Affairs at Sowerby Bridge . . . 451
Purchase of the Cardiff Water Company . . . 451
Sewage Experiments at Derby . . . 451
Re-arrangement of the Brighton Water Supply . . . 451
A Question of Road Repair at Devonport . . . 451
Leading Article:—
Gas Legislation for 1878 . . . 451
Correspondence:—
The Education of the Gas Manager of the Future . . . 453
The Cost of Coal and the Price of Gas . . . 453
The Powers of Gas Companies in Regard to the Supply of Fittings and Stoves . . . 453
Naphthaline Deposits in Gas-Pipes . . . 453
Legal Intelligence:—
Roborough Police Court—Liability of a Water Company to Reinstate Roads . . . 453
Miscellaneous News:—
Shrewsbury Water Supply . . . 454
Liverpool Water Supply . . . 454
Meeting of the Crystal Palace District Gas Company . . . 455
Meeting of the Bristol Gas Company . . . 456
Report on an Analysis of Two Pipe Deposits . . . 456
Meeting of the Rockhampton (Queensland) Gas Company . . . 457
Brighton Corporation Water Supply . . . 457
Local Government Board Inquiries . . . 458
The Electric Light in Paris . . . 460
The Lighting of our Ways and Homes . . . 461
Trade Reports . . . 462
Bristol Water-Works Company . . . 463
Belgrano (Buenos Ayres) Gas Company . . . 463
Sevenoaks Water-Works Company . . . 463
Register of New Patents:—
Gubbins and Whitestone—Valves for Gas, Water, or Steam Pipes, &c. . . . 463
Wallace and Claus—Purification of Gas, &c. . . . 463
Marshall, F. D.—Manufacture of Gas . . . 464
Hopper, G. C.—Lighting and Extinguishing Gas Flames . . . 464
Henderson and M'Neil—Regulating the Flow of Water . . . 464
Haddan, F. W.—Liquid-Meter or Water-Power Engine . . . 464
Melling, T.—Water-Meters . . . 464
Rennick, C.—Lighting and Extinguishing Gas . . . 465
Paine, W.—Liquid-Meters . . . 465
Morgan-Brown, W.—Automatic Gas-Lighter . . . 465
Application for Letters Patent . . . 465
Patents which have passed the Great Seal . . . 465

TO CORRESPONDENTS.

ERRATA.—*In last week's "Circular to Gas Companies," p. 413, 2nd col., 22nd line from bottom, for "minimum" read "maximum." In Dr. Wallace's report "On the Best Means for the Development of Light from Coal Gas of Different Qualities," p. 423, an accidental misplacement of a line causes some confusion. The last seven lines of the first paragraph should read as follows:—*

"The gas used somewhat extensively in the United States, made by saturating air with petroleum spirit, requires to be burned at a pressure not exceeding 0·1 of an inch, which can be obtained only with an Argand with very large holes, or a bat's-wing of peculiar construction, called the American regulating bat's-wing. At ordinary pressures, such as are used for coal gas, there is scarcely any light, and the flame keeps about ¼ inch or more above the burner."

GEORGE BRAY AND CO., CUM MULTIS ALIIS.—*Next week.*

We may here again remind our readers that letters arriving later than Saturday cannot, as a rule, be inserted in the next issue.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 24, 1878.

Circular to Gas Companies.

IN this number we commence our publication of abstracts of the several measures passed in the last session of Parliament, which concern Gas Companies. They call for but little comment. As will be seen, the sliding scale and auction clauses have been imposed together in very few of the measures passed. The lines of the Model Bill issued by the Board of Trade have been followed in but a few cases. Auction clauses appear in almost every measure which confers the power to raise further capital; but the sliding scale is absent in many. With regard to auction clauses, it may be noted that the Acts require the payment of the full nominal value of shares and the premiums, within three months of the sale. The premiums received are, of course, to be applied, as they always have been, as capital not entitled to dividend. The consequences of this legislation we have repeatedly referred to. Auction clauses, it may be admitted, make a company secure, but they undoubtedly involve some injustice to individual Shareholders, whose position seemed to be assured by the Companies Act of 1845. We regard this as a distinct breach of faith on the part of those who manipulate our legislative measures; but it is now useless to protest. It will be seen that in all cases the Gas-Works Clauses Amendment Act, 1871, is incorporated, and that testing-places are to be established which, generally speaking, are to be erected at the works of the Company. Except in one instance only, the degree of purity required by the Act 1871 is made compulsory. The exception is the Shrewsbury Gas Act, which prescribes that the amount of the "sulphur" impurity shall not exceed twenty grains per hundred cubic feet, but does not set out the means by which the amount of that impurity shall be determined. We once more call attention to the fact that these Acts require Companies to pay interest of five per cent. on deposits. We have advised Companies to rigidly exact deposits from all consumers, which may serve them as well as borrowing money; and when the consumers know that they are, in a measure, participators in the profits of the undertaking, it will naturally tend to keep them on good terms.

The only Act which requires special reference to is the Hartlepool Gas and Water Act. It is, of course, a combined undertaking, and the Act gives the Company power to raise £200,000 additional capital, half of which is allotted to the gas, and the other half to the water undertaking. The curiosity is that the capital to be raised for the gas undertaking is to be offered by auction, while no such provision is made with regard to the portion to be applied to the water undertaking. As the dividends will be equal on all shares of the Company, we fail to see the necessity for any enactment of this kind. Purchasers of gas shares will probably get them at par, and thus all will be right.

We publish in another column a letter on the electric light, by Professor Silliman of New York, furnished by Mr. Reid of Edinburgh. Frankly speaking, it does not help us much to a knowledge of the form which the electric light will eventually take; but there is this common agreement between our own opinions and those of the eminent physicist whose letter we publish, that the new light cannot, at all events for the present, invade our domestic establishments. The display in Paris appears to daze every one who beholds it. All come away wonder-stricken with the magnificence of the light, but ignorant of the cost at which it is produced. How it is done we do not know; but of this we feel certain, that if there was any chance of profit being made, London streets and public places would long ago have been illuminated by electricity.

It is not a bad time for Corporation Engineers and Surveyors, not a few of whom have been commissioned to pay a visit to Paris, to see and report upon the electric light. The Gas Inspector of the Bristol Sanitary Authority has been, and he reports to his employers that the light is really very beautiful and very powerful, but that he was unable to obtain any information as to the cost at which it was produced. Mr. Hollingshead, of the Gaiety, could give him no details as to the expense of the light. He could only tell him that, when the machines could be procured, a great display of the light would be made in the London streets. From the Metropolitan Municipal Authorities no information was procurable. They are still thinking over the matter, and no doubt when the proper time arrives they will pour a flood of light upon the Metropolis. We shall not be at all sorry to see our thoroughfares better illuminated. The Authorities are too mean to effect this by the agency of gas, and we may leave them to the prospect of doing it by a system which will cost twice as much.

The report of the Directors, and accounts of the South Metropolitan Gas Company for the past half year, have been issued in anticipation of the next general meeting of Shareholders. The accounts show that sufficient profit has been made to allow of the payment of a dividend of eleven and a half per cent.—the highest, we believe, that has ever been paid by a Company under statutory powers. The sliding scale in this instance works with remarkable effect, and we can easily understand the obstacles which stand in the way of the amalgamation we so much desire to see. But, unless we are mistaken, matters will presently change. There are everywhere symptoms of a revival in trade, and one of the first evidences will be an increase in the price of coal. This will not immediately affect Gas Companies who have contracts for the next two years; but the remote consequences will be apparent to every one. The South Metropolitan Company do well to keep a large floating balance in hand. They cannot, at present, further reduce the price of gas, for it would be no advantage to them, inasmuch as a larger dividend than they now pay is, for the present, impossible. The Directors will propose, having raised the whole of the capital authorized up to 1869, to convert it into stock—a very wise proceeding. When we publish the accounts and the report of the meeting, we may refer to one or two points which appear to us of much interest. At the present moment, it is sufficient to refer to the large balance in hand. The Company offer a spectacle which is so far quite unique, and our only fear is that their success will lead to some reaction against the sliding scale.

The half-yearly meeting of the Crystal Palace District Gas Company was held last week, and it is no wonder that the pro-

ceedings passed off satisfactorily. Everything, in fact, was *couleur de rose*. Full dividends, a good balance to carry forward, low coal contracts for the next two years, and an announced reduction in the price of gas—everything, in fact, to make the hearts of shareholders and consumers rejoice. A passage in the speech of the Chairman has brought out a letter from Mr. Hollingshead. It was somewhat indiscreet of Mr. Wilson to assert that when the Paris Exhibition closed the electric light would come to an end. As a matter of fact, the light has nothing to do with the Exhibition, and has been in action, more or less, for the last two or three years. We shall soon learn the particulars of Mr. Hollingshead's projects, and be able to see the extent of competition to which we shall be subjected. Like Mr. Wilson, we have not the smallest fear of the competition, and shall certainly cling to our gas shares.

The half-yearly meeting of the Bristol Gas Company was held last Wednesday, when, as a matter of course, the report of the Directors was unanimously adopted. The profits of the half year, notwithstanding the reductions made in the price of gas, allowed of the payment of full dividends, and leave a balance to be carried forward. At the meeting, reference was naturally made to the electric light. We have already alluded to the report of the Bristol Gas Inspector who went to Paris, and can only express our astonishment at the scant information which visitors to Paris bring back with respect to the light. Professor Silliman's letter tells us little more than the report of the Bristol Inspector, and we suppose we shall have to wait until the invention is in full use in this Metropolis before we get reliable details as to its utility and cost.

The Aldershot Gas and Water Company have had a tolerably successful year's working, and are able to pay the modest dividend of six per cent. for the year. Having expended the whole of the capital they have power to raise, they propose now to go to the Board of Trade for a Provisional Order, under which they will, of course, be exposed to all modern pains and penalties. Their position is, however, so good, and Aldershot grows so fast, that the Company must, in the end, be very successful.

The Birmingham Gas Committee cannot escape the attacks of carping critics. They have recently been assailed by a Mr. Lowe, with some of whose opinions we sympathize, but certainly not with those regarding the recent Gas Exhibition. Mr. Lowe is evidently a Protectionist of the first order. He accuses the Town Council of introducing the goods of manufacturers of other cities, to the injury of the Birmingham manufacturers. We are sorry to notice nonsense of this sort, but it shows the sentiments entertained by a good many men other than Mr. Lowe. They are wishful to send as much of their manufactures to London as possible, but object to the introduction of London goods into their own district. Speeches of this kind will have no effect upon the proceedings of the Town Council, who will continue to persevere in the course they have adopted, to the great benefit of their constituents.

The Local Board of Ilkeston have applied to the Central Authority for permission to borrow £30,000 for the purchase of the undertaking of the Ilkeston Gas Company. The works, it will be remembered, were sold for £25,000, and it seems that about £4000 are required to make alterations. The Board will, no doubt, obtain power to raise the money; but what success will attend the venture it is not easy to see. The design of the Board was evidently to make a large profit to assist the district rate; but their hopes must have been somewhat damped when the Government Inspector told them that "the loan, if granted, "would be, not to make the Board a trading Company, that "they might profit thereby; but, if sanctioned, it would be with "a view to benefit the town, by securing a better and cheaper "supply of gas." Here is the enunciation of a sound principle which should always be observed by Local Authorities who obtain possession of gas undertakings.

We wish we could persuade the Corporation of Manchester to see the matter in this light. From the accounts of the Corporation, just issued, we observe that the gas profits made during the past year amounted to £111,594, and out of this sum nearly one-half, or £51,996, is carried to the improvement-fund. This is, of course, so much additional taxation thrown upon the shoulders of the gas consumers, who ought to pay little more than half what is now charged for gas. Before long we feel satisfied that Manchester consumers will be roused to a sense of the injustice now done to them, and will insist on considerable reductions in price. While making this large contribution to the improvement-fund, the Committee add, at the same time, £17,119 to their reserve. There is really no excuse for the present price of gas in Manchester, which ought to be immediately reduced.

A Solicitor of Torquay has recently refused to pay his gas account, on the grounds of the quality of the gas being low, and the pressure insufficient. He escaped the payment of part of the claim for a technical reason, which we scarcely appreciate. Supposing the gas had been supplied at a lower pressure or of worse quality than was prescribed, the consumer had his remedy at law, and the fact could not have been pleaded as a justification for refusing payment of a debt. We are astonished to see that the Company apparently do not intend to carry the case further. The magisterial decision we regard as eminently unsatisfactory, and the case should have been taken to Quarter Sessions. A report of the case will appear in next JOURNAL.

We call attention to the letter of Mr. Jones, in reply to a portion of Mr. Woodall's report to the Corporation of Leeds. Others besides this gentleman have entertained an idea that the cost of gas does not depend on the price of coal; but we rather think that most have recanted their opinion. The matter is well worthy a full discussion, for by-and-by we shall again have dear coals, and if Mr. Woodall's proposition can be maintained, Companies will not then be justified in raising the price of their gas.

Water and Sanitary Notes.

SOME years ago a man was twenty minutes under the water of the Irwell, and was naturally taken out dead. Afterwards an ingenious theory was started that the man was not drowned, but poisoned by the filthy water of the stream into which he fell. Folly is contagious, and it is not surprising to find silly people repeating the stupid invention in connection with the late melancholy accident to the *Princess Alice*. The Metropolitan Board have, no doubt, much to answer for, but we cannot allow that their sewage operations had the least to do with the deaths of the victims of this sad catastrophe. It is only making use of an empty figure of speech to say that sewage is poisonous. The purest water would drown an individual in as short a space of time as the foulest sewage. It would be absurd to notice the statements we refer to, but for the fact that currency is given to them in the columns of the leading journal, which, however, supplies an antidote in the shape of a editorial article. London sewage cannot for the present, and will not for very many years to come, be diverted from the River Thames. To treat it chemically would be impossible, in consequence of the bulk. Irrigation is also altogether out of the question. To take the sewage out to sea would necessitate the expenditure of several millions, and, when the work was done, a large quantity would come back with every returning tide, and matters would be but little mended. It may be remarked that towns below the outfalls do not complain of nuisance. Whether or not the channel of the river is being gradually blocked-up by sewage deposit is an open question. That the river is poisoned is perfectly and monstrously untrue.

We have referred elsewhere to the gas undertaking at Aldershot, and need here only notice an interesting fact connected with the water supply. The gravel into which the Company's well was sunk gave out after a few dry seasons, so the Company resolved to go deeper and tap the chalk, which was found at a depth of only 220 feet. An ample supply of water is now obtained, and we would recommend the Company to shut out the supply from the gravel, and only distribute the purer water from the chalk.

Abingdon is somewhat exercised on the question of its water supply, and more particularly, under the circumstances, as to the quantity necessary for the daily use of an individual. The source from which a majority of the townspeople are supplied is not likely to yield more than a daily average of ten gallons per head of the population; but this quantity Mr. B. Denton considers sufficient, and so do we. Mr. Harrison, who lately conducted an inquiry into the matter, stated that in his house only seven or eight gallons per head are used. Such a quantity, we believe, would be amply sufficient, and, before long, steps must be taken to lessen the immoderate waste, not only in London, but in most other large cities. Norwich offers an example which may well be followed in many other places. There the Company have, by exercising judicious control, reduced the daily consumption of water to about sixteen gallons per head, and still every one rejoices in abundance. Returning to Abingdon, we may note that Mr. Denton expresses his preference for a river supply, and would take his water from the gravelly beds lying along the shore. From imperfect reporting, perhaps, we have not a very comprehensible account of the two schemes which are suggested for the supply of Abingdon; but, so far as we can see, we may recommend Mr. Denton's river scheme as the one which can be best depended upon at all seasons of the year. The others seem liable to failure, and a drought is a very serious matter.

Something might, perhaps, be done in saving water by the Local Board of Sowerby Bridge, who, it is said, lose annually about £600 by their undertaking, while the consumption of water, estimated upon the entire population of the district, is thirty gallons per head daily, when, as a fact, only two-thirds of the inhabitants take the water. The disposal of sewage is necessarily a difficult question at Sowerby Bridge. The Local Board are anxious, if possible, to withdraw their refuse from the Calder, but are at their wits ends for a scheme which will enable them to dispose of it otherwise. The Local Government Board will, no doubt, allow them time to mature a plan, for it cannot be denied that no one in Gwydyr House is much better able to plan a scheme than one of the humblest mechanics of Sowerby Bridge.

The Cardiff Water Company seem likely to disappear. Last session they obtained additional powers; but it would appear that some arrangement is being proposed, by virtue of which the undertaking will be bound to fall into the hands of the Corporation of Cardiff. The purchase, it is reported, is based on four per cent. annuities, which looks very small; but the Cardiff Company have never been particularly prosperous, and the Corporation are welcome to do the best they can with the undertaking.

Experiments with sewage have been commenced at Derby. They are made on the old lines—sulphuric acid being the chief deodorizer, or disinfectant, or whatever it may be called. It is now a good many years since we heard a distinguished physician announce at Oxford that he had made a "sulphate of sewage," which was perfectly harmless. Time has moved since then; but whether any advance has been made in the scientific treatment of sewage, we will not undertake to say. The experiments at Derby are to be continued, and we may possibly hear that they have got beyond making a "sulphate of sewage."

Some reconstruction of the water service of Brighton having become necessary, Mr. Easton, C.E., has prepared a plan which is calculated to give all parts of the town an adequate supply, and put the Corporation to but a small expense. The difficulties are, of course, in the supply of the higher districts, for which, however, the plans provide. A re-arrangement of the mains and pumping-stations is calculated to equalize the supply in all districts, and, when the alterations are completed, Brighton will be in a good position as regards its water service.

An interesting case has been heard at Devonport. The Water Company opened a trench on one side of a road, which was properly filled up and the causeway made good; but while the work was in progress the traffic on the opposite side of the way caused damage to the road, which the Company did not feel bound to repair. The consequence has been that the Trustees of the Turnpike Trusts summoned the Company for the cost of repairing the roadway, and the penalties for leaving it out of order. It was shown on the hearing that the part of the road which the Company had disturbed was effectually repaired, and, accordingly, the summons was dismissed, but without costs. The case is of some importance, inasmuch as we do not remember a dispute involving the same point.

GAS LEGISLATION FOR 1878.

In the past session of Parliament thirty-two Acts relating to gas undertakings received the Royal Assent. Nine of these incorporate Companies hitherto without statutory powers; nine confer additional powers on Companies previously incorporated; nine confirm the transfer of undertakings from Companies to Local Authorities; and five give additional powers to Corporate Authorities in respect to undertakings they already possess.

The Acts incorporating Companies are as follows:—

The *Brading Harbour District Gas Act* is to incorporate the Brading Harbour District Gas Company, and enable them to construct gas-works for the supply of certain districts in the Isle of Wight. The capital of the Company is to be £20,000, in £10 shares, carrying the usual borrowing powers of one-fourth. The dividend on borrowed money converted into capital is not to exceed five per cent. The maximum price of gas is 6s. per thousand feet, and the illuminating power is to be not less than fourteen candles, tested by Sugg's "London" Argand, No. 1. The Gas-Works Clauses Act of 1871 is, of course, incorporated, and the prescribed testing-place is to be at the works. Interest is to be paid upon deposits received from consumers, at the rate of five per cent. per annum.

The *Castleford and Whitwood Gas Act* incorporates the Castleford and Whitwood Gaslight and Coke Company. The present capital of the Limited Company is £30,000, in £5 shares, of which £20,300 has been paid up. The Incorporated Company gain power by this Act to raise an additional £30,000; and, as a matter of course, all the shares, both original and new are to be of the nominal value of £10 each. The Act restrains the Company from raising more than £5000 of new capital in a single year; but if less be raised in any one year, the difference may be added to the sum to be raised in another. The Limited Company have no mortgage debt, so power is given to borrow to the usual extent, on both original and additional capital. The illuminating power of the gas to be supplied is to be not less than fourteen candles, tested, as usual, by Sugg's "London" Argand, No. 1. Subject to the sliding scale, the initial price is to be 4s. 7d. per thousand feet. The standard dividends are to be ten per cent. on the original, and seven per cent. on the new shares, which are, of course, to be put up for sale by auction or tender to the general public, and such as are not sold may be offered to existing Shareholders at the reserve price. Any excess of profit over the amount required to pay standard dividends may be, at the discretion of the Directors, devoted to the formation of an insurance-fund, or to a reserve-fund applicable to the payment of the dividends whenever the profit falls short of the amount required. Beyond this, the Act confers upon the newly-constituted Company all the powers usually granted to a gas undertaking.

The *East Grinstead Gas and Water Act* is to incorporate the East Grinstead Gas and Water Company, formed to take over the undertakings of a Company constituted, under a Deed of Settlement, in 1855. The consideration to be paid by the new Company is £5790, and the transfer was to take place on the 12th of December last, up to which time the old Company were responsible for all debts and liabilities. The provisions of this Act are of a somewhat complicated character; but as the Company is a small matter, and its affairs are of merely local interest, we need not detain our readers with any account of them. Gas of fourteen-candle power is to be supplied at a price not to exceed 6s. per thousand feet within a radius of one mile from the works, and 7s. beyond.

The *Hemel Hempsted District Gas Act* is to dissolve two Gas Companies, and incorporate the Shareholders into a Company to be known as the Hemel Hempsted District Gas Company. The total original capital of the two Companies amounts to £17,500, all paid up, and neither has any mortgage debt. The additional capital which this Act authorizes is £20,000, the usual borrowing powers being granted for both new and old shares. The original capital is entitled to ten per cent. dividend, and the new is limited to seven per cent., subject to the sliding scale which is imposed by this Act. The initial price fixed by the Act varies from 5s. 3d. to 6s. 6d., according to the distance of the consumers from the works. Gas of fourteen-candle power is to be supplied, tested by the new "London" Argand, No. 1. Auction clauses are, of course, inserted. The Act gives the newly-formed Company power to buy up some insignificant undertakings within their district, and generally confers all the powers usually granted to Gas Companies.

The *Lea Bridge District Gas Act* is to incorporate the Lea Bridge District Gas Company with power to supply gas to Walthamstow and a portion of the parish of Leyton. The original capital of the Company consists of £50,000, in £10 shares, of which £35,000 has been subscribed and paid up, and they have borrowed, on debenture bonds, £7000. By this Act they obtain power to raise a further £50,000, carrying the usual borrowing powers. The standard rate of dividend on the original stock is, of course, ten per cent., and that on the additional, seven and six per cent., according as it is issued as ordinary or preference capital. The sliding scale is imposed, and the initial price is 5s. per thousand cubic feet. The illuminating power is to be fourteen candles, tested as usual by the "London" Argand, No. 1. Auction clauses are inserted, and the premiums realized are to be applied in the usual manner. The supply of the district now included in the limits of the Lea Bridge District Gas Company has undergone some vicissitudes. A Company called the South Essex Gaslight and Coke Company first started the works, which were subsequently bought by the County and General Company, and were afterwards sold to the present Lea Bridge District Company, in whose hands we hope they will remain for the profit of future generations of Shareholders. A sensible arrangement has been made with the West Ham Company, which removes doubts as to the right of the Lea Bridge Company to supply gas to certain portions of the parish of Leyton.

The *Lewes Gas Act* incorporates the Lewes Gaslight Company, constituted by deed of settlement in 1822. The capital of the unincorporated Company amounts to £26,880, all paid up, and the Company have no mortgage debt. By this Act the Company obtain power to raise £25,000, in stock or shares of not less than the nominal value of £10 each, which are, of course, to be

offered by auction or tender. The standard rates of dividends, subject to the sliding scale, are to be ten per cent. on the original, and seven and six per cent. on the additional, according as they are issued as ordinary or preference capital. The illuminating power of the gas supplied is to be fourteen candles, and the initial price fixed is 6s. per thousand feet within the borough, and 7s. outside.

The *Lichfield Gas Act* incorporates the Lichfield Gas Company, formed under a deed of settlement in 1835. The capital of the Company, registered in 1856, was £10,000. Since then, by special resolution, the capital has been increased by the issue of six hundred £10 shares, and considerable sums have been expended out of profits on extensions. By this Act the Company acquire power to raise additional capital to the extent of £25,000, which is to be called B capital. The original, consisting of £15,000 and £6000, to be called A. Both classes of capital carry the usual borrowing powers, the unincorporated Company having had no mortgage debt. Subject to the sliding scale, the standard rates of dividend will be ten cent. on the original, and seven and six per cent. on the additional, according as it is issued as ordinary or preference. The gas to be supplied is to be of fourteen-candle power, and the initial price fixed is 4s. per thousand feet within a mile and a half radius from the Guildhall, and 5s. beyond. Provision is made in this Act that, if the Corporation require it, within five years from the passing of the Act, the Company shall sell to the Corporation their undertaking, by agreement or arbitration, under the Public Health Act, 1875.

The *Marske and Saltburn Gas Act* incorporates the Marske and Saltburn Gas Company, with power to supply gas to the township of Marske and surrounding district. It also authorizes an amalgamation with the Redcar Gas Company; but we do not consider it necessary to go into particulars of the distribution of shares of this latter Company. The capital of the newly-formed Company named above is to be £40,000, carrying the usual borrowing powers. Fourteen-candle gas is to be supplied, and the price is not to exceed 5s. per thousand feet. Auction clauses and the sliding scale are not imposed by this Act.

The *Normanton Gas Act* incorporates the Normanton Gas Company, with power to supply gas to Normanton and surrounding neighbourhood. The original capital was £20,000, of which £18,000 has been paid up. By this Act the Company obtain power to raise additional capital to the amount of £45,000. The Company have no mortgage debt, and, therefore, the usual borrowing powers are granted in respect of both old and new capital. Subject to the sliding scale, the standard dividend on the original capital is to be ten per cent., and seven per cent. on the additional. Preference capital is, as usual, to be entitled to six per cent. The illuminating power of the gas to be supplied is to be fourteen candles, and the initial price 4s. 7d. per thousand feet. Along with the sliding scale, auction clauses are, of course, inserted.

The *Tredegar Water and Gas Act* incorporates a Company to take over the gas and water undertakings hitherto worked by the Tredegar Iron and Coal Company, Limited. The capital expended upon these works appears to have been £30,000, and no mortgage debt has been incurred in respect of them. The additional capital authorized by this Act is £30,000. The dividend allowed on the original capital is, of course, ten per cent., and that on the additional seven or six, according as it is issued as ordinary or preference. The illuminating power of the gas to be supplied is fourteen candles, and the price is not to exceed 5s. 6d. per thousand feet.

The following are the Acts which confer additional powers on Companies already incorporated:—

The *Bournemouth Gas and Water Act* authorizes the Bournemouth Gas and Water Company, with present paid-up capital of £100,000, and full borrowing powers exercised, to raise new capital to the amount of £150,000, carrying ordinary borrowing powers. Subject to the sliding scale, the dividends on the original and additional capital are as usual. The initial price of gas is to follow a descending scale with the efflux of time. For three years it is to be 5s. 6d. per thousand feet in Bournemouth; for the following three years, 5s. per thousand feet; and after the expiration of another period of five years, 4s. 6d. per thousand feet. The differential price outside Bournemouth we do not notice. Auction clauses are, of course, inserted along with the sliding scale.

The *Exeter Gas Act* authorizes the Exeter Gaslight and Coke Company to acquire further lands, and raise additional capital. The amount already expended on the undertaking is share capital to the amount of £60,000, and borrowed money £7500. This Act authorizes the Company to raise new capital to the amount of £100,000, carrying the usual borrowing powers. The sliding scale is introduced, and the standard or initial price is to be 4s. per thousand feet. Along with the sliding scale the auction clauses are inserted. The Act is of very small importance, for the undertaking will in a short time fall into the hands of the Corporation of Exeter.

The *Farnworth and Kearsley Gas Act* empowers the Farnworth and Kearsley Gas Company to acquire further lands and raise additional capital. The Company have already raised, and expended on their works, share capital to the amount of £50,000, and loans £11,500. This Act gives them power to increase their capital to the amount of £100,000, carrying the usual borrowing powers. The quality of gas to be supplied is to be fourteen candles, at a price fixed, we presume, by the Company's previous Act of 1868. The sliding scale does not appear to be imposed, but auction clauses are inserted.

The *Hartlepool Gas and Water Act* confers additional powers upon the Hartlepool Gas and Water Company. The capital already raised by the Company is £200,000, and they have borrowed £50,000, the whole of which has been expended on the works. By this Act they obtain power to raise a further sum of £200,000, with the usual borrowing powers. This capital is to be divided equally between the gas and water undertakings, and it is curious to note that the shares issued for the purpose of the gas undertaking are to be offered by auction or tender, while no such provision is made in respect of the shares issued for the water undertaking. This would appear to be a very anomalous arrangement, for we may assume that the profits of the Company are divided equally between the gas and water undertakings. Gas of fourteen-candle illuminating power is to be supplied at a maximum price fixed by a previous Act.

The *Imperial Continental Gas Association Act* confers further powers on the Imperial Continental Gas Association. In the first place, it authorizes the Association to write up their shares to the full nominal value—viz., £50—the fact being that only £43 15s. is deemed to have been paid thereon. Next it authorizes the capitalization of all profits *bond fide* expended on the works in the future. As a matter of course, the stock so created will be allotted among existing Shareholders *pro ratâ*. The Association having no necessity to borrow money, get relieved of the power to effect loans which they obtained in 1870. They further obtain a power very unusually granted, to return to Shareholders capital not required for the purpose of the Association.

The *Radcliffe and Pilkington Gas Act* authorizes the Radcliffe and Pilkington Gas Company to acquire further lands and raise additional capital. The Company have already raised and expended £100,000 on the undertaking. By this Act they acquire power to add a further sum of £120,000 to their capital, carrying the usual borrowing powers. The new capital is to be offered by auction or tender in the ordinary manner, with the customary restrictions. Gas to be supplied of fourteen-candle power, at a maximum price fixed by a previous Act.

The *Shrewsbury Gas Act* extends the powers of the Shrewsbury Gaslight Company. The present capital of the Company is £40,000, divided into three classes of stock, entitled to different rates of dividend. By this Act the Company obtain power to raise a further sum of £40,000, with customary borrowing powers. This capital is to be offered to the public by auction or tender, and the premiums applied in the usual manner. The gas is to have an illuminating power of fifteen candles, is to be perfectly free from sulphuretted hydrogen, and is not to contain more than twenty grains of "sulphur" in one hundred cubic feet. Complaints of defects are to be made within fifteen days. The price of gas is not to exceed 5s. per thousand feet within the borough, and 5s. 6d. per thousand feet beyond.

The *Torquay Gas Act* confers additional powers on the Torquay Gas Company. The Company have raised and expended on their undertaking £45,000, and have converted their loans into share capital. By this Act the Company acquire power to raise £30,000, with the usual borrowing power, and the new capital is to be offered by auction or tender. Gas of fifteen-candle power is to be supplied, at a price not to exceed the maximum fixed by a previous Act.

The *York United Gaslight Company's Act* extends the limit of the York United Gaslight Company, and empowers them to raise further capital. It also gives authority for the purchase of additional land on which to erect new works. The additional capital authorized is £80,000, carrying the customary borrowing powers. The Company escape auction clauses and sliding scale. The maximum price is fixed at 3s. 6d. per thousand feet within a radius of two miles of Ouse Bridge, and 4s. beyond. Gas of fourteen-candle illuminating power is to be supplied, tested in the usual way.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

THE EDUCATION OF THE GAS MANAGER OF THE FUTURE.

SIR,—Having reference to the letter of "Isca," in last week's JOURNAL, and to your remarks thereon, I may say that the subject of them has for a considerable time past engaged my attention, and I purposed, if my time permitted, to bring before the next meeting of the British Association of Gas Managers the result of my cogitations, in the form of a paper or scheme, the adoption of which would have for its object the fulfilment of "Isca's" recommendations. In the meantime, I shall be happy to receive communications from all who are interested in the subject.

W. H. BENNETT,
Secretary of the British Association of Gas Managers.

22, *Great George Street, Westminster, Sept.* 21, 1878.

SIR,—"Isca's" communication and your commendation of the same will now, I sincerely hope, beget an interest in this really important question. How important, will be seen by referring to another portion of the same issue of your JOURNAL. Nothing can be advanced that will show more forcibly than that, the necessity of action being taken in the matter. The British Association can take action; it has power to raise the qualification of candidates, and I, as an ordinary member of the Association, trust that it will do so.

As the President of the North of England Association, I have drawn the attention of the northern members to the matter. In my address last year, I said, "These district Associations will be so many technical schools, through which many of their members will pass on to what will become an *Institute*, the constitution of the British Association being changed to meet the progressive requirements of our profession; the district Associations taking to themselves all who hold positions of trust and responsibility in gas-works, the Institute being open only to those winning a position by their professional attainments."

"The frugal stoker transmuted into a manager" (quoting your "Circular") "is a sight at which all must rejoice." There is, however, another and a more important change yet to be made—the transmutation of the manager into a professional man; and another and a still higher change to be effected—the conversion of the professional man into the scientist; and each of these classes should be recognized by our Association, and the highest position opened to the humblest stoker.

There must be, however, another qualification than that of merely manager of works to the higher position. It must be personal attainments, if the science of gas lighting is to advance, and our Association take the position it should occupy amongst professional bodies. Our Association door has now been open long enough to managers with that position as the only qualification to membership. All have had the opportunity of becoming members. Create now the other class—associates—and elect from them to the higher position of member. The tone of the profession will then be raised, and the gas manager, as a member of the Association, will more highly value his position, it being one that has been laboured for, and will confer upon him a truly professional position.

In conclusion, I must express my indebtedness to you for your support in this matter, and also a hope that the members of the Association will support any movement of the Committee, if they think it desirable.

W. J. WARNER.

South Shields, Sept. 20, 1878.

THE COST OF COAL AND THE PRICE OF GAS.

SIR,—I have read Mr. Henry Woodall's report to the Corporation of Leeds, in your last issue, commencing with this startling paragraph: "There is a prevailing belief that the selling price of coal gas is mainly dependent on the price of coal. For my own part, I have long felt persuaded that a more erroneous or mischievous opinion could hardly exist." Mr. Woodall explains that, in speaking of the cost of coal, he means "the cost, less income derivable from products other than gas; the market value of these, like that of coal, being practically beyond the control of the gas manufacturer."

"Income derivable from products other than gas" generally amounts to 50 per cent. of the cost of coal, and it requires but a very few figures to show the "erroneous and mischievous opinion" of Mr. Woodall, in his assertion that the cost of gas does not depend on the price of coal.

I will give you figures from my own books for six consecutive years—three years prior to, and three years of high prices for coal:—

Cost of coal, 14s. 4½d. per ton; residuals, 54·5 per cent.					
"	14	1½	"	" 54·6	"
"	15	9	"	" 56·0	"
Average of the three years for coals					14s. 9d.
Less residuals					8 1½
Net cost of coals					6 7½
Cost of coal, 25s. 2d. per ton; residuals, 57·3 per cent.					
"	27	0	"	" 49·0	"
"	21	2	"	" 52·0	"
Average of the three years for coals					24s. 5d.
Less residuals					12 11
Net cost of coals					11 6

The difference between 6s. 7½d. and 11s. 6d., the net cost of coals, being 4s. 10½d., represents 6½d. per 1000 cubic feet of gas; and, if Mr. Woodall had been responsible for the financies, as I was during the six years above referred to, he would have found his gas costing him in the latter three years 6½d. more per 1000 feet than during the first three years above alluded to.

Mr. Woodall says if we can create a demand for heating and cooking, this demand would be most felt in summer. I do not think so. In winter time we require artificial heat, and not during the summer. I have three bed-rooms and two day-rooms with gas-stoves; these are never lighted except in cold weather. My boiling trivet is used in winter time quite as much as in summer, for servants do not get up very readily on a dark winter morning, and the gas trivet is brought into requisition to boil the kettle while the kitchen fire is being lighted.

Mr. Woodall's optimist views of increasing the sale of gas 50 per cent. by the introduction of 2s. stoves, with an increased profit of 16d. per 1000 feet on gas so supplied, are a little too "erroneous" for circulation.

R. H. JONES.

Dover, Sept. 18, 1878.

THE POWERS OF GAS COMPANIES IN REGARD TO THE SUPPLY OF FITTINGS AND STOVES.

SIR,—Absence from home prevented my seeing yours of the 10th inst., containing Mr. H. Woodall's letter, headed as above, until this day. In reading over the "case," it occurred to me that the opinion thereon might have been modified if the attention of Counsel had been directed to sec. 14 of the Gas-Works Clauses Act, 1847, which would be incorporated in the Leeds New Gas Company's Act, 1854, and reads thus:—

"The undertakers may let for hire any meter for ascertaining the quantity of gas consumed or supplied, and any *fittings for the gas*, for such remuneration in money as shall be agreed upon," &c.

The clause further secures these "meters and fittings" against distraint.

"Gas-fittings" are generally understood to imply gaseliers, brackets, lamps, &c. These may be used also for candles and oil. "Gas-fittings" also include pipes, elbows, taps, and sundry other articles which may be used for water and other liquids; but gas-stoves cannot be adapted *to any other use;* in fact, are absolutely valueless until fitted to the gas for which they were constructed.

The Harrogate Gas Company both sell and let on hire gas-fittings of all descriptions, stoves, and other articles and things in any way connected with the supply of gas to our consumers, and find it to be advantageous to both parties.

P. H. WILKINSON, Secretary to the Gas Company.

Harrogate, Sept. 20, 1878.

NAPHTHALINE DEPOSITS IN GAS-PIPES.

SIR,—In reference to the correspondence published in last week's JOURNAL between the Town Clerk of Preston and the Engineer and Secretary of the Gas Company, will you kindly allow me to say a few words in confirmation of Mr. Green's opinion—that if the lamp-taps were larger there would be little cause for complaint?

We used to be very much troubled with our street-lamps from this cause, it frequently happening—especially in the spring and autumn—that nearly all the lamps in our district were either entirely extinguished, or the light reduced to the size of a candle, until the matter became quite unbearable, and we were compelled to try some remedy. At that time we used the ordinary lamp-tap of about one-eighth of an inch bore of plug, with another small tap attached to regulate the size of the light. We did away with both of these, and substituted a stop-tap with three-eighths of an inch bore right through. Instead of the small tap to regulate the size of light, we used Sugg's regulator-burner—the "Winsor"—which answers the purpose far better than a check-tap; and from that time—over twelve months ago—we have never had a single case of stoppage or diminished light from this cause.

As the regulator forms part of the burner, no deposition occurs in its contracted aperture, as it is not exposed to variations of temperature.

HIGH HEATS.

Legal Intelligence.

ROBOROUGH POLICE COURT.—MONDAY, SEPT. 16.

(*Before Messrs.* M. BERE, R. GILL, *and* J. P. DEACON.)

LIABILITY OF A WATER COMPANY TO REINSTATE ROADS.

The Plymouth Dock (Devonport) Water Company, by their Secretary (Mr. A. B. Bone) and Surveyor (Mr. H. Francis), were summoned by Mr. C. L. Radcliffe, on behalf of the Trustees of the Plymouth and Tavistock Turnpike Trusts, for having opened and broken up the soil of certain portions of the roads from Stoke to Knackersknowle, and from Weston Peverell to St. Budeaux, on the Tamerton branch of the trust, in the parishes of Egg Buckland and St. Budeaux, thereby damaging the roads. The Company having, it was asserted, refused to put the roads in repair, according to the statute, the Trustees contended that they had incurred a penalty by way of forfeiture to them of a sum not exceeding £5 for every such offence, and had incurred an additional sum of £5 for each day during which such delay continued after they had received due notice thereof.

The case had been adjourned from the previous Monday, in order that Mr. Radcliffe, who acts as Clerk to the Magistrates, might procure a solicitor to conduct the case. Mr. J. SHELLY now appeared for the Turnpike Trustees; the Company being represented by Mr. R. G. EDMONDS.

Mr. EDMONDS said that before the case was gone into he must object to the Magistrates adjudicating upon it, on the ground that all the Justices were Trustees of the turnpike road, and they consequently had no jurisdiction; and, furthermore, that no public meeting of the Trustees had been called, as was required by the Act. He also contended that the summons was not valid, inasmuch as it specified no particular part of the road which had been broken, but took in the whole of it from Stoke to Knackersknowle; and as Stoke was in Devonport, the presiding Magistrates could have no jurisdiction over that part of the road. The Company's Act said they were liable only after a notice had been served on them, setting forth that proceedings were to be instituted against them. They had had no notice, nor was it stated in what manner they were to repair the roads. He thought they were entitled to know the particular parts of the road they were supposed to repair, and the date since which they had been liable.

Mr. BERE said the Bench were of opinion that notice had been given, but whether it was insufficient was another question.

Mr. EDMONDS said he supposed the summons was not to remain in its original form, setting forth as it did that the Company were liable to reinstate the whole road from Stoke to Knackersknowle.

Mr. BERE: If you say that your clients are really put to disadvantage by certain portions of the road not being mentioned in the summons the case shall be adjourned, in order that the omission may be supplied. I do not myself think the summons is very artistically worded.

Mr. EDMONDS: We should like to have it artistically worded.

The names of certain portions of the road were then inserted in the summons.

Mr. SHELLY, in opening the case, said that, under their Act of Parlia-

ment, the Company were empowered to bring the water from Dartmoor to Devonport, and in doing so had the power of cutting a leat, laying watercourses, pipes, or other devices they might think necessary for conveying water from its source to its destination. Under one clause it was enacted that all trenches made, and damage done to the road in breaking the soil for the laying of such pipes and watercourses, should be reinstated, and the rubbish carried away by them; and that they should keep the same in good repair for the space of six months, or for such time as the soil continued to subside, not exceeding twelve months; and, failing this, they should forfeit a sum not exceeding £5 for every such offence, and a similar penalty for every such day as the offence was continued. Last year the road was opened by the Company for the purpose of laying new pipes, and the Trustees intimated to them that the road was much injured thereby, and they would have to reinstate it, or pay a sum of money to the Trustees. The Company chose the former course.

Mr. EDMONDS, interrupting, said there was no date whatever fixed upon, and it might have occurred 13 months ago.

The 31st of August of this year was then fixed as a date, this being the day before the serving of the summons.

Mr. SHELLY was about to read some correspondence which passed between the Trustees and the Company, but

Mr. EDMONDS objected, as the letters were prejudicial, and because the correspondence had taken place prior to Aug. 31.

Mr. BERE thought if the letters merely gave a history of the case they should be read; but if they were prejudicial they could not be gone into.

Mr. SHELLY then read two formal notices, and remarked that if the Company would reinstate the roads fairly the Trustees would be perfectly satisfied, and withdraw from the case. All they wanted was common justice.

Mr. EDMONDS replied that the Company had already spent more than they ought to have done in the matter, and they would now fight the case out.

Mr. *C. L. Radcliffe*, Clerk to the Trustees of the Turnpike Trusts, was called, and gave evidence as to the road being improperly repaired, and to its having been much injured by the whole of the traffic being driven over one small portion of the road and footpath in consequence of the other being occupied by the excavators.

Mr. EDMONDS pointed out that the summons did not deal with the part of the road which was injured by the traffic in consequence of the other part of the road being broken.

Mr. BERE said that, according to the clauses under which the proceedings were instituted, the Magistrates could only deal with the part of the road which was opened. It must, therefore, be clearly understood that the inquiry was relative only to the non-repair of the trench.

Mr. SHELLY, after a consultation with Mr. Radcliffe, said that under these circumstances they would not go on with the case.

Mr. EDMONDS thought that, as the case was dismissed, and he had, previous to these proceedings, clearly pointed out to Mr. Radcliffe the point upon which the case would turn, the Company were entitled to costs.

The Bench declined to allow costs.

Miscellaneous News.

SHREWSBURY WATER SUPPLY.

At the Meeting of the Shrewsbury Town Council, on Monday, the 9th inst.—Alderman EYTON in the chair—the following report as to the proposed water supply from Church Stretton was presented:—

The Gas, Water, and Lighting Committee, having conferred with the Stretton Water Committee in reference to the scheme which the latter Committee had under consideration, and having in their company visited Stretton, and inspected the proposed source of supply, have arrived at the conclusion that a further and more searching inquiry is desirable.

The quantity and quality of the water appears to be satisfactory, but the question of taking early steps for bringing the water into the borough must turn in a great measure upon the probable cost of the purchase of land and execution of the necessary works in making reservoirs and laying pipes. This estimate cannot be formed without a most careful examination into the nature of the ground, and the works that would be requisite to make a reservoir of sufficient capacity, and the quantity and price of the land required for that purpose, and for permission to carry the line of pipes, and also the compensation, if any, that would have to be made. The obtaining of these particulars must necessarily involve an expenditure of a greater amount than your Committee are authorized to expend without the previous sanction of the Council.

Under these circumstances, your Committee, with the full concurrence and assent of the Stretton Water Committee, beg to recommend that the appointment of the latter Committee be superseded, and that your Committee be clothed with full authority to take all necessary steps for preparing a definite scheme for bringing a supply of water from Stretton, and obtaining all necessary data for forming an estimate of the probable cost of the works.

Mr. V. CRUMP, in moving that the report be adopted, said he was glad that many members of the Council had been so interested in the scheme, that they had taken great pains to acquaint themselves with the full particulars of it. There was now no question at all, he thought, that there was sufficient water and of a very superior quality, and that being decided, the next step was for the Committee to come before the Council and ask them to sanction the calling in of a properly qualified engineer to advise as to what the cost would be. Various amounts had been stated, but as yet they had nothing they could depend upon. There could be no doubt of this, that if the scheme could be carried out at a reasonable cost, it would prove to be one of the greatest boons that Shrewsbury could ever possess, for a full supply of really good water was a most invaluable blessing. He therefore hoped the Council would give the Committee the necessary authority to employ an engineer to advise them as to the cost and so on.

Mr. F. FLETCHER said he had much pleasure in seconding the proposition. Of late he was more convinced than ever that the water from the proposed source was not only the best water that could be obtained, but it could be brought to the town by gravitation. Since the Committee were appointed, the Corporation had bought the water-works, which gave them the benefit of the rates and the right of supplying the town with water, and the Stretton Water Committee therefore thought it best to ask the Gas, Water, and Lighting Committee to take the duties upon themselves. He himself was quite convinced as to the soundness of the scheme. During the last eighteen months he had paid more than fifty visits to the different valleys and springs where the supply came from, and he had been long convinced that Shrewsbury ought to be supplied with water from this source. There were no engineering difficulties in the way, for the pipes could be laid along the turnpike road almost all the way to Shrewsbury. Some people talked a good deal about compensation, but he had made full inquiries, and had satisfied himself that the ground required was of such a nature that it could not cost very much money. The pipes would be carried for about nine miles along the road to the town, and he did not think that the waywardens of the district would ask for anything very heavy in the way of compensation. He did hope that the Council would give the Committee such instructions as would enable them to commence what was proposed at once. He did not want at that time to go into the question of the supply of Severn water, but if the members would read the report of Mr. Bateman, they would see that it was not what it should be, and that the engine power was not sufficient.

Mr. LAWSON urged the necessity of carrying on the extension of the conduit water supply, as already passed by the Council.

Mr. EYTON said he supposed there ought to be some limit as to expense to be incurred by the Committee.

Mr. CRUMP said that he did not know that they could fix any limit; but the Council could depend upon it that the Committee would not spend more money than was really necessary.

Mr. COCK thought it was the imperative duty of the Council to see that every house was supplied with the best water that could possibly be obtained. He thought the cost was a secondary consideration. Until they bought the water-works they could do nothing; but now they had the works, let them see every one was supplied with plenty of good water.

Mr. WHITE said after all it was a financial question, although the cost ought not to be too closely considered in so important a matter. They must cut their coat according to their cloth, and he should like to know whether, when they had ascertained the probable cost, they would at present be prepared to incur the expense, seeing what they had hanging over their heads in the way of sewerage. It was not only a question of cost, but of time. If this water supply scheme were adopted, would not the whole attention of the Borough Surveyor and his officials be devoted to that question? And where would the other work be in the meantime? They might do the water, but they must do the sewerage, and they did not know how soon they might be called upon to do it. It would not be for long, they might depend upon it, that the Rivers Pollution Act would be allowed to remain a dead letter with them, and they ought to be prepared for the expense and the work which must soon fall upon them. The sewerage question was very pressing; the question of a better water supply could stand over, not for ever, but for a time. They had had a sewerage scheme by gravitation; but it was so costly, and, to some extent, doubtful, that they were not prepared to adopt it, and now they must consider some other scheme. He agreed with the report of the Committee, and with all that had been said as to the importance of a good supply of water; but he did not think the Stretton scheme was yet ripe. He was glad to hear the views of the Committee, for they would be useful hereafter; but he did not think they were in a position to proceed further at present.

Mr. DAVIES urged that if the report of the Committee were adopted and acted upon it would not be shelving the sewerage question. Mr. Butler, the Surveyor, had laid before them his gravitation scheme, and was preparing a pumping scheme, and what was proposed would not in any way be putting a clog upon the sewerage. Then, again, London was emptying its sewage into the Thames, and other towns were discharging theirs into the rivers, and he did not see why Shrewsbury should be in such a hurry to avoid doing so. They were saving £600 or £800 a year by the water-works, and he did not think that the question of expense ought to be looked upon as so important a matter as the water supply.

Mr. TURNER said there were several matters which ought to be looked at. First of all they would have an additional revenue. Then they would save the cost of pumping, which he believed amounted altogether to something like £1300 a year. He believed, too, it was a fact that their engines were in such a state that they were not fit to do the work required of them, and they would have to purchase new engines before very long. He believed the cost of the Stretton scheme would not be so very great, and he hoped the Council would properly consider the whole matter and adopt the report, for it would be very discouraging to the Committee if that were not done after the great pains they had taken in the matter, and the expense they had put themselves to. He did not believe that the sum now proposed to be spent by the Committee would be very much, and it would, of course, be an open question afterwards whether they carried out the scheme or not.

Mr. G. EVANS said the Stretton water was certainly very beautiful, and the scheme was well worth entertaining; but if they proposed to go on with it it would be far better to get an independent engineer. Everything should be pointed out to him, and they should take care to get a man who would not be influenced by any members of the Council to carry out their pet projects, but who would select what was really the best. Of course, the question of cost must be considered, for it was quite possible to buy gold too dearly, and he did not himself consider the present water supply so bad as some tried to prove it to be. He thought they could carry on for some time as they were. He believed there would be claims for compensation if the water was taken from Stretton, and advised them, if they called in an engineer at all, to engage the best man they could get.

Mr. CRUMP, in reply, said he could not agree with Mr. White as to the desirability of postponing the question of the water supply. The Committee did not propose to take up any of Mr. Butler's time, but would get help of the best kind, so as to leave him to deal with the sewerage. Then Mr. White had said that the question was not ripe; but he (Mr. Crump) thought it was ripe, for it had been under discussion for eighteen months, and it ought to be decided, whether it was worth going on with or not. He did not himself think there was any very great difficulty in the way. Then they should look at the revenue they derived from the water-works at present, and what they would save in the expense of pumping, for by the Stretton scheme they would be supplied with water by gravitation, which would rise 350 feet above the English Bridge, and they would have a splendid supply in every part of the town. He did not think it would cost the town very much, and he did not believe there was any one in the town who would object. As to the sewerage, he thought a good water supply was ten times more important.

The report was then unanimously adopted.

LIVERPOOL WATER SUPPLY.—At the annual meeting of the Board of Conservators of the Severn fishery district, held at Worcester last Thursday, the question of the proposal of the Liverpool Corporation to take a supply of water from the Verniew, one of the effluents of the Severn, was again brought before the Board. Mr. Willis Bund (the chairman) reported what had transpired since the last meeting of the Board, when it was resolved to open communication with the Liverpool Corporation to ascertain what compensation they proposed to give. He stated that he had communicated with the Town Clerk of Liverpool, and had received a reply stating that the matter would be laid before the Water Committee. He had also received the supplemental report of the Water Sub-Committee, in which it was proposed to increase the capacity of the reservoir from 8000 million to 10,000 million gallons, and to divert the water from the Marchmant tributary, which, with the small stream, the Afon-y-Ddalan-Gwiriorsi, was proposed to be devoted to compensation water. He remarked that the great difficulty he had always felt was that the rainfall over the gathering-ground was not sufficient to supply the volume of water it was proposed to divert, and he thought the Board should have accurate information before coming to any decision. In moving the adoption of the report, he said the new plans of the promoters indicated that there was no finality in their propositions, and expressed an opinion that the capacities of the water-shed were over-estimated. He doubted whether it would afford sufficient water for Liverpool itself, to say nothing about any compensation water being left.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly Meeting of this Company was held at the Albion Tavern, Aldersgate Street, London, on Thursday last—ERASMUS WILSON, Esq., F.R.S., in the chair.

The following report and accounts were submitted to the Proprietors:—

The Directors report that the general working of the Company during the half year has been satisfactory.

The Directors have taken advantage of the low price of coal to secure contracts for all the coal required till March, 1880.

The Directors have resolved to reduce the price of gas to the general consumer to 3s. 9d. per 1000 cubic feet, to take effect from and after the Michaelmas quarter.

The reports of the Gas Examiners of the parishes supplied by the Company, with respect to the illuminating power of the gas and its freedom from sulphuretted hydrogen and ammonia, continue to be satisfactory.

The accounts annexed show the financial position of the Company. The balance of profit and loss account amounts to £11,103 2s. 11d. Out of this sum the Directors recommend the declaration of a dividend for the half year ending the 30th of June last as follows, viz.:—At the rate of 6 per cent. per annum on the preference stock; at the rate of 7 per cent. per annum on the ordinary 7 per cent. stock; at the rate of 10 per cent. per annum on the ordinary 10 per cent. stock; and at the rate of 7 per cent. per annum on the new ordinary 7 per cent. shares, all less income-tax. This will absorb £10,188 16s. 10d., and leave £914 6s. 1d. to be carried forward to the profit of the succeeding half year.

REVENUE ACCOUNT, *for the Half Year ended June* 30, 1878.

Dr.					Cr.				
To Manufacture of gas—					By Sale of gas—				
1. Coals, including all expenses		£17,846	10	7	Lady-day quarter—				
2. Purifying materials, wages, &c.		950	4	11	1. Private rental—				
3. Salaries of Engineer and Officers		482	10	0	1,234,300 cubic feet, at 3s. 7d.	£221	2	11	
4. Wages and gratuities		2,816	12	0	2,141,800 ,, 3s. 9d.	401	11	9	
5. Works, machines, and retorts—					560,500 ,, 3s. 10d.	107	8	7	
Maintenance of, repairs, and labour	£3803 0 8				108,919,200 ,, 3s. 11d.	21,330	1	3	
Less old material sold	88 5 9							£22,060	4 6
		3,714	14	11	2. Public rental and under contracts			1,796	18 2
		£25,810	12	5	Midsummer quarter—				
Distribution of gas—					3. Private rental—				
6. Salaries of Chief Inspector, Inspectors, and Clerks in Light Office	£672	12	2		1,186,900 cubic feet, at 3s. 7d.	£212	12	11	
7. Mains and service-pipes, repairs, maintenance, renewal, and labour	796	4	0		1,351,900 ,, 3s. 9d.	253	9	8	
8. Meters, gas-stoves, and regulators, repairing and renewing, &c.	1,069	2	1		53,883,200 ,, 3s. 10d.	10,327	12	3	
		2,537	18	3				10,793	14 10
Public lamps—					4. Public rental and under contracts			1,819	4 5
9. Lighting and repairing		680	3	11	Gas-rental			£36,470	1 11
Rents, rates, and taxes—					5. Meter-rental—the half year			638	2 4
10. Rents	£7	11	6		Total rental			£37,108	4 3
11. Rates and taxes	1,521	15	1		Residual products—				
		1,529	6	7	6. Coke, less labour and cartage	£6,466	14	10	
Management—					7. Breeze ,, ,,	194	0	0	
12. Directors allowances	£750	0	0		8. Tar	1,100	16	7	
13. Salaries of Secretary, Accountant, Clerks, and Messenger	529	11	0		9. Sundries	7	14	0	
14. Collectors commission	833	15	2			£7,769	5	5	
15. Stationery and printing	261	13	11		10. Sulphate and ammoniacal liquor, less labour, &c.	1,820	12	8	
16. General establishment charges	393	0	5					9,589	18 1
17. Auditors	30	0	0						
		2,798	0	6					
Sundries—									
18. Law and parliamentary charges		87	16	1					
19. Bad debts		188	11	9					
20. Insurance-fund		204	10	6					
21. Horses and carts		310	5	0					
Total expenditure		£34,147	5	0					
Balance carried to profit and loss account		12,550	17	4					
		£46,698	2	4	Total receipts			£46,698	2 4

PROFIT AND LOSS ACCOUNT (NET REVENUE).

To				By				
Reserved fund account, amount carried from the half year's profits	£2,000	0	0	Balance of net profit from last account	£10,012	7	0	
Balance of net profit to be carried to next account, subject to half year's dividends to the 30th of June	11,103	2	11	Less dividend paid for the half year ended the 31st of December	9,669	15	10	
							£342	11 2
				Balance from revenue account, being profit for the half year			12,550	17 4
				Interest on contingent-fund, &c.			209	14 5
	£13,103	2	11				£13,103	2 11

The CHAIRMAN, in moving the adoption of the report and accounts, said: Gentlemen, we are able upon this occasion, as upon past occasions, to make a satisfactory report with regard to the progress of the Company during the past six months. You will observe that we have taken advantage of the opportunity which has been thrown in our way of obtaining a contract for a considerable supply of coals, which will last us until March, 1880. The advantages which we derive from having this stock in anticipation, and at our hands, will show themselves in the after profits, which we hope to be able to make during our working. We have also recurred to a custom which commenced at a very early period of our existence, that of reducing the price of gas to the consumers, and, as you will perceive by the third paragraph of the report, the price of gas to the general consumers is henceforth to be 3s. 9d. per 1000 feet. We are, you see, by degrees, coming down to the minimum price charged in the Metropolis. This reduction has not been made without carefully inquiring into the state of the finances of the Company. We have also used our best exertions to maintain the degree of purity of gas which is judged best suited to the purposes of our consumers. The last paragraph of the report will tell you how, after having allotted a portion of our profits to the reserve-fund, we are still able to carry over £914 to the profit of the succeeding half year. All these points show the healthy state of the Company, and we ourselves feel very confident that the concern is working as well as possible. But there is no doubt that some of the Shareholders may have had their interest in gas manufacture somewhat influenced by the reports which have reached them on the subject of the electric light. Epidemics of diseases occur from time to time, epidemics of discovery, epidemics of alarm. We are dealing with one of the great products of this country—coal—and we are converting it into the material of our manufacture. It has been proposed of late years to make electricity subservient to a similar purpose, and an experiment upon a very large scale is at this moment being made in Paris, in order to show the amount and extent of light which can be produced by that agent. I call it advisedly an experiment, because, as it is carried out in Paris, it would be inapplicable to practical purposes. It has been conceived that because there is a great light which has been modified by careful contrivances it must naturally be a thing which is to supersede other modes of obtaining light. But there is another side to the question. We may buy our advantages too dearly, and the buying of electric light would simply tend to our bankruptcy and ruin. At the present moment it is impossible to obtain the light or regulate it without an amount of expense which would render it highly extravagant. It is beautiful as an object of curiosity, but useless for the purposes of every-day life. In fact, the light, even in itself, is only applicable at the present moment to the public lighting of streets; it would be impossible to introduce it into our houses—to place the control of the electric apparatus under the direction of our housemaids; for we might be seized in the middle of the night with a tremendous fit, that would make us believe that the end of the world was at hand, and then find out perhaps in the morning that it was some little neglect on the part of the manager of the electric machine that had shaken every muscle of our bodies to our very toes. We have troubles enough in the control and management of coal gas; our trials would be greatly enhanced if we had to deal with an element that requires such careful, such scientific manipulation as electricity. I believe that the smallest electric light that can be at present produced is a blaze amounting to a light of 1000 candles. Now, this blaze would be so great that it would put out the eyes of those who looked upon it, and it would produce such deep shadows as to render the roads at night even more dangerous than they would be in perfect darkness; but as man is never at a loss for contrivances, a method has been discovered by which the light may be reduced to the power of 700 candles, which is not so unmanageable or uncontrollable. A separate apparatus, worked by a steam or a gas engine, is required for each group of lights, about 300 yards apart. The position of the matter at the present moment is such that it need not excite the slightest apprehension in our minds that so useful an article as that in which we deal is likely to be interfered with for a considerable number of years. Of course, science is progressive. There is no calculating to what limit science may advance; but if the agitation of this question is calculated to produce cheap gas shares, my advice to every one present would be to buy them. The alarm will not induce me to sell a single share. It might be supposed that such a great light as 700-candle power cannot be obtained by any other means; but I am informed that Mr. Wm. Sugg, who is now making experiments upon this subject in Paris and at home, has succeeded in producing a burner which, with a consumption of 300 feet of gas per hour, will produce a light equal to the electric light I have been referring to. An 8-horse gas-engine, to work the electric machine, consumes 300 feet of gas per hour. With the electric light, the candles must be constantly changed, whereas the gas burns continuously. Of course, at the present time we are not sufficiently acquainted either with the process itself or with its various details to come to any very satisfactory conclusion; but it may be fairly stated, with regard to the experiment which is going on in Paris, that when the Exhibition is at an end this electric light will come to a close, and that it is rather to be regarded as an ornament to the present display which is taking place in Paris than as a practical, solid application which would make us feel that it was a thing to be dreaded. My conclusion would be simply this, not to fear it in the slightest degree; but, nevertheless, we may keep our eyes open to the progress of science, and be prepared, when the opportunity arrives, to avail ourselves of it as well as others. I now beg to propose that the report, with the accounts appended thereto, be received, adopted, and entered upon our minutes.

Mr. F. L. LINGING seconded the motion, which was unanimously agreed to.

Mr. H. P. STEPHENSON (the Deputy-Chairman) moved—"That a dividend for the half year ending the 30th of June last be now declared at the following rates per annum:—6 per cent. on the preference stock, 7 per cent. on the ordinary 7 per cent. stock, 10 per cent. on the ordinary 10 per cent. stock, and 7 per cent. on the new ordinary 7 per cent. shares, all less income-tax, and be made payable forthwith."

Mr. GEORGE LIVESEY seconded the motion, which was unanimously adopted.

Mr. J. B. PADDON, in moving a vote of thanks to the Directors for their able management of the affairs of the Company, said that one glance at the report and accounts would be a sufficient justification for his motion. He had a grateful recollection of many equally prosperous half years. It was about 16 years ago when the Shareholders began to get maximum

dividends, and he believed they had received them uninterruptedly from that time to the present. A policy that could produce this effect must be called a good policy, especially when it was remembered that the Company had had no immunity from difficulty or adverse conditions; indeed, they had had their full share of them, although they had not been prominently brought before the Proprietors, except as to their results. They might see the measure of progress by looking backwards. He had been looking through a file of the Company's accounts, and had observed that for the half year ending June, 1868, the rental was just one-half its present amount, yet a considerable reduction had been made in the price of gas. He had also noticed that, for every million feet of gas, the Company employed in that year £1040 capital, while at the present time they only used £730. In that year about £1200 was carried to a contingent-fund, and there was no reserve-fund at all, while at the present time the insurance, contingent, and reserve funds amounted to £20,000. These facts showed that their business had considerably extended. While the profits had increased, the price of gas had been reduced, and their property had been made more valuable and secure. He thought the best thanks of the Shareholders were due to those by whose agency such an admirable state of things had been brought about.

Dr. G. Puckle seconded the motion, and said he thought the Directors were entitled to the thanks of the public as well as of the Proprietors, seeing that by an improved process of dealing with the residual products they had attained a position which he had formerly expressed a hope they would attain, and had even gone beyond it, and had been able to reduce the price of gas to the general consumers.

The motion was carried unanimously.

The Chairman said he desired, in the name of the Directors, to thank the Proprietors very heartily for the kind manner in which their labours had been recognized. It was satisfactory to find that the vote of thanks had been moved by a Shareholder who had such great experience in all matters connected with gas manufacture, and who had shown that he had not put the motion as a mere matter of form, but had looked into the accounts, and studied the position of the Company at the present time as compared with their position ten years ago. He would take that opportunity of moving a vote of thanks to the Auditors and Officers of the Company for the efficient discharge of their duties. All who were connected with the Company had endeavoured to act together harmoniously and unanimously, and the remark applied especially to the Officers of the Company—the Auditors, whose zeal was known to all present, the Engineer, the Secretary, the Clerks, and all who were connected with the concern.

Mr. Linging seconded the motion, which was unanimously agreed to.

Mr. Glaisher acknowledged the vote of thanks, and said he believed that every officer with whom he had been brought into contact endeavoured faithfully to discharge the duties of his office. Every time he went to the works he was struck with the order and good management everywhere prevailing.

Mr. Bengough proposed a vote of thanks to the Chairman for his conduct in the chair. They were all aware, he said, that whatever Mr. Erasmus Wilson took in hand he would accomplish, as was abundantly testified by the recent history of Cleopatra's Needle.

The motion was seconded by Mr. Beeton, and unanimously carried.

The Chairman, in acknowledging the vote, expressed a hope that the Company would prove as lasting and as steady as Cleopatra's Needle itself.

The proceedings then terminated.

BRISTOL GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday —Mr. F. Terrell in the chair.

The Secretary (Mr. H. H. Townsend) read the notice convening the meeting, and the following report was taken as read:—

The Directors submit to the consideration of the Proprietors the statement of the accounts of the Company for the half year ended the 30th of June last, and it is satisfactory to observe that, notwithstanding the reduction in the price of gas, and the general depression of trade, the revenue is sufficient to enable the Directors to recommend the payment of the usual dividend.

A reduction in the price of coal has been effected in the contracts for the current year, the benefit of which has not yet, of course, been fully realized.

Contracts will now almost immediately be entered into for a portion of the new works at Stapleton, and the buildings be commenced with as little delay as possible.

The Directors think it right to mention that as a great deal has been said recently in the public prints with reference to lighting by electricity, they have obtained a considerable amount of information on the subject from various reliable sources, and they are convinced that there is no just ground for apprehending that the use of this light will cause any diminution in the consumption of gas. The light is extremely beautiful and pure, but, both in a mechanical and financial sense, there are difficulties to be overcome, which at present are very far from accomplishment.

Three of the Directors retire at this meeting by rotation—viz., Mr. Western, Mr. Colthurst, and Mr. Spark; also Mr. Tribe, Auditor, the whole of whom are eligible for re-election.

The Directors regret to report the death of Mr. George Thomas, for many years past one of the Auditors of the Company. It will be necessary at this meeting to appoint another Auditor to fill the vacancy thus occasioned.

The Directors recommend that a dividend at the rate of 10 per cent. per annum on the capital of the Company entitled to dividend, be declared and made payable at the bank of Messrs. Miles, Cave, Baillie, and Co., Bristol, on and after Monday, the 30th of September inst., subject to the deduction of income-tax.

The Chairman said, as usual at their half-yearly meeting, there remained but very little for him to speak of in recommending that the report be adopted. They were going on very well altogether, and considering the reduction that had taken place in the price of gas a short time back, their revenue was very favourable. They were indebted in some measure to the number of fresh houses bringing fresh customers to the Company. The reduction in the price of the gas, as they were well aware, made a very large hole in the revenue. Six months would not be sufficient to fill up that hole, and cover the reduction; but the Directors hoped—indeed, they were confident—that with the accession of fresh customers they would do as well as they had hitherto done. Their works were in excellent condition, and their new buildings were in fair progress. He believed he might say that the report, taken altogether, was a very favourable one. One matter that seemed to have affected some holders of gas stock was the new light that had suddenly appeared. He could not say that a new light had broken on them, but the subject had been forced on their attention, and the Directors of this Company, in common with others, had been compelled to notice it. The light was of too fine a nature, and he might say of too threatening a nature, as respected gas companies, to pass over unnoticed. The great protection, he thought, that gas companies had against the electric light was, first of all, the difficulty of producing it; secondly, the expense of production; and thirdly, the difficulty in applying it. A great deal of gas was used in private houses, and there it would be impossible to manipulate the electric light. He was not sufficiently acquainted with the scientific nature of the light to enlarge upon the subject, but he believed it would be found useful for lighting the public streets and large spaces, and that it would be ultimately a valuable adjunct to gas. Whether it would ever be utilized further it was not for him to prophesy, but it could hardly be used as gas was used, and for cooking and private lighting he thought it would be found impracticable of application. He should, therefore, impress on the holders of gas stock not to be at all alarmed at the new light, nor to be frightened at the thought that injury would be done to them. He was not at all alarmed at it himself, and he was strengthened in his opinion by that of others. He had consulted a great many authorities, and they all tended to show that although the electric light might eventually be a most useful light for large places and open spaces, it could never be applied to domestic uses. Gas shareholders might, therefore, rest tolerably happy as far as regarded it.

Mr. T. T. Taylor seconded the motion, and remarked that the consumption of gas continued to increase. Gas was now extensively used in private houses for cooking and lighting purposes, and it was also being used more and more as the motive power of engines, for a gas-engine could be easily regulated, and when idle no expense was incurred. He believed that the consumption of gas would steadily increase, and that their revenue would be as large as before the reduction in price. He thought they had every reason to be satisfied with the prospects of the Company.

Mr. R. W. Giles hoped that the electric light would be used for street lighting, and that gas companies might do something to educate the people as to the proper way of applying gas in private houses.

The report and accounts were then adopted unanimously, and, on the motion of the Chairman, seconded by Mr. J. Colthurst, a dividend at the rate of 10 per cent. per annum was declared.

The Chairman moved the re-election of Messrs. J. D. Weston, J. Colthurst, and W. Spark as Directors, remarking that their services were extremely valuable to the Company.

Mr. H. O. Wills seconded the motion, which was carried with acclamation.

Mr. Weston returned thanks, and said the first duty of the Directors was to earn 10 per cent. for the Shareholders, and then, by vigilance and economy, to reduce the price of gas for the benefit of the public.

Mr. Spark also thanked the Shareholders, and promised to give his best attention to the interest of the Shareholders.

Mr. Colthurst, in acknowledging the vote, said he had represented the Shareholders on the Board for many years, and as long as he retained their confidence, he should be happy to continue to do so.

On the motion of the Chairman, seconded by Mr. Giles, Mr. W. Tribe was re-elected Auditor.

Mr. Tribe, in thanking the Shareholders for his re-election, said he should always endeavour to see that the accounts were kept straightforward and fair.

The Chairman said, by the death of Mr. Thomas, who had been one of their Auditors for about 20 years, there was a vacancy for an Auditor. The Directors would not vote, but leave the appointment with the Shareholders. There were three candidates—Mr. A. Thomas, Mr. H. Grace, and Mr. S. Hare.

These three gentlemen were proposed and seconded, and on the voting by the Shareholders present, the following was the result:—Grace, 30; Thomas, 45; and Hare, 10. The proxies were put in, and then the result was—Grace, 704; Thomas, 464; and Hare, 341. Mr. Grace was therefore elected.

Mr. Grace returned thanks for his election, and expressed his hope that he should be able to discharge the duties with satisfaction to the Proprietors.

A vote of thanks to the Chairman and Directors terminated the meeting.

Report on an Analysis of Two Pipe Deposits.—The following report on this subject has recently been presented by Mr. Thomas Fairley, Borough Analyst, to the Leeds Corporation Water Committee:—The deposits were analyzed to ascertain their character and probable mode of formation in the water supply-pipes. The deposits were soft, and when first received had a disagreeable smell. Under the microscope, they appeared amorphous, and without any crystalline character. The deposits contain in 100 parts—

	From Pipe Received Aug. 16.	From Pipe Received Sept. 3.
Moisture	32·41	31·15
Organic matter and combined water	7·30	7·00
Silica	1·22	1·11
Oxide of iron	57·60	58·56
Carbonate of lime	1·21	1·40
Carbonate of magnesia	0·42	0·45
	100·16	99·67

These analyses are, I believe, very accurate, and show that the deposit in each case consists practically of hydrated peroxide of iron. If there was formerly in these pipes a deposit, consisting of carbonates of lime and magnesia (deposited from a harder water), then the action of the present soft water has been to dissolve these carbonates. The deposit of iron, which is now found in the pipes, is either the part of this old deposit which is left undissolved by the soft water, or it is iron separated out of the soft water as it passes through the pipes, or it is due to both these causes acting together. This last hypothesis is, in my opinion, the most likely to be correct. The deposit is not in itself of an injurious character. The smell no doubt arises from the peculiar character of the oxides of iron in taking up organic matter from water, and retaining it persistently even in contact with a vast volume of water. The total nitrogenous organic matter present in the deposits is about 0·25 per cent., as determined by careful analysis. The iron in the deposit is probably partly derived from the material of the pipes, and partly from the water which has passed through them since they were first laid. After the water has been turned off, or any change made in the pipes, the first water drawn from the taps contains much of this deposit in suspension, and the consumers ought to allow this ochrey water to run off before using any from the supply-taps. So far as iron contained in the present water supply is concerned, a great portion of it would be precipitated by sufficient exposure to the air before using. The very small quantity of earthy carbonates (carbonates of lime and magnesia) present in the water as now supplied, will, however, render this process of precipitation of the iron slower than it would be if a larger quantity of these carbonates were present. Mr. Fairley also adds the following:—Report on analysis of three waters from iron. No. 1. "Sample of water taken in Swinsty Tunnel, Aug. 17, 1878." No. 2. "Sample of water taken in the clear water well, Weetwood, Aug. 19, 1878." No. 3. "Taken from the supply-tap in the offices, 16, East Parade, Aug. 29, 1878." The waters contain in grains per gallon:—

	No. 1.	No. 2.	No. 3.
Iron calculated as peroxide of iron	0·126	0·028	0·028

These numbers show that a process of separation of oxide of iron in its passage through the pipes and filter-beds is going on, and that there is no action perceptible of the water upon the iron pipes, so far as one can judge by the iron present in the water as supplied. The iron present in the water in Swinsty Tunnel partly separates out on standing for a few days exposed to the air. This, no doubt, partly explains the deposit in the pipes, especially after the water is aërated in passing through the filter-beds. Any old deposit in the pipes, from the former harder water containing carbonates of lime and magnesia, must also cause the precipitation of any iron dissolved in the water.

ROCKHAMPTON (QUEENSLAND) GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, the 20th of June last—HENRY JONES, Esq., in the chair.

The SECRETARY (Mr. H. Mills) read the notice convening the meeting, and the following report of the Directors for the half year ending the 31st of May:—

The balance-sheet shows a profit of £814 18s. 9d. on the business of the past six months.

Of the capital employed as fixed investment—viz., £13,193 15s. 7d., the Company have on hand for extensions and future use a good supply of gas mains, pipes, retorts, fire-bricks, &c., to the value of about £1409. One bench of retorts has been renewed this half year, and another will be erected to meet the increasing demand.

Mr. Walter Alfred Stephens has been appointed Engineer in the room of the late Mr. W. Smith.

In April last the railway station was supplied with gas; and extensions were made in Alma and Denham Streets. Other extensions are in hand, which are likely to be profitable. Increasingly large capital is in use for meters, on which the Company make no charge for rent; but heavy as this item is, the Directors believe they have adopted a sound policy in merging this expenditure in the rent charged for gas.

The Directors propose a dividend for the half year at the rate of 10 per cent. per annum, payable at the Company's office on and after the 21st inst.

Two Directors having left the Board, their seats have been temporarily filled by Messrs. W. F. Walton and J. W. Face.

At this meeting the Shareholders have to elect two Directors in the place of Messrs. A. Grant and A. Bell, represented by Messrs. W. F. Walton and J. W. Face, who retire by rotation, but are eligible for re-election, and have given the requisite notice. Mr. Heinrich Schmidt is also a candidate, and has given the requisite notice.

Two Auditors have also to be appointed at this meeting for the ensuing year.

Dr. — *Profit and Loss.* — *Cr.*

Manufacture and distribution of gas—			Balance, Nov. 30	£816	11 8
Management	£1051	19 6	Sales of gas, coke, and tar	1917	11 3
Discounts on gas-rents	76	18 3	Rent of dwelling-house	22	10 0
Dividend, Dec. 22	653	11 11	Scrip and transfers	1	18 6
Reserve-fund	162	19 9	Bad debt recovered	1	16 9
Profit this half year	814	18 9			
	£2760	8 2		£2760	8 2

Liabilities and Assets.

Capital	£15,000	0 0	Fixed investment	£13,193	15 7
Less due and not called up	1,806	6 0	Floating investment — Coal, coke, and tar	150	0 0
	£13,193	14 0	Amount due from insurance	355	7 0
Unclaimed dividends	5	10 0	Sundry debtors	554	18 3
Reserve-fund, May 31, 1877	227	16 3	A. J. S. Bank	137	3 5
Reserve-fund, Nov. 30, 1877	162	19 9	Cash in hand	13	14 6
Profit and loss	814	18 9			
	£14,404	18 9		£14,404	18 9

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that it was with pleasure, on this the eleventh half-yearly meeting of the Shareholders, that he was able to state that the Company were in a satisfactory position, that the business was increasing, and he trusted it would continue to do so.

Mr. CONNOLLY seconded the motion.

Mr. LIVERMORE said he would like to know if the Chairman could explain the cause of the present inferior quality of the gas. They were all aware that the gas was bad, and as this had not formerly been the case, it would be satisfactory to learn the cause.

The CHAIRMAN said the matter had come under the consideration of the Directors, and the Engineer had reported to them that it was attributable to the inferior quality of the coal. Formerly they had used the A. A. Company's coal, which was the best obtainable; but, owing to the late strike of the miners at Newcastle, that coal could not possibly be got, no matter what price was offered. The Directors, however, were doing their best to remedy the defect, and a little shale was now used with the coal. They expected a cargo of coals in a fortnight, and had hopes to fully remedy the defect referred to.

The motion was then put and carried unanimously.

The retiring Directors—Messrs. Walton and Face—were re-elected, and Messrs. W. G. Jackson and W. H. Buschel were appointed Auditors for the next twelve months.

Mr. LIVERMORE moved that, in recognition of the faithful and efficient services of Mr. Smith, the late Engineer to the Company, the sum of 20 guineas be presented to his widow.

Mr. GRANT seconded the motion, and bore testimony to the able and efficient manner in which Mr. Smith had performed his duties.

The motion was put and carried, and a vote of thanks to the Chairman and Directors terminated the meeting.

BRIGHTON CORPORATION WATER SUPPLY.

At the usual Fortnightly Meeting of the Brighton Town Council, last Wednesday—the MAYOR (Alderman Mayall) in the chair—the following report of the Water-Works Committee was received, and entered on the minutes:—

The Water-Works Committee have had under their consideration the necessity of improving the water service of the town, and they are also desirous of being in a position to supply the whole of the water required from either pumping-station, and, with a view of considering the whole question, in January last they referred the matter to Mr. Edward Easton for him to report.

Mr. Easton's report has had their very careful consideration, and, subject to the alteration hereafter named as to water-engines, the Committee unhesitatingly recommend to the Council that the new works proposed by their Engineer should be carried out. The Committee propose that one water-engine should be provided capable of raising 50,000 gallons in the 24 hours, as that will be very largely in excess of the present demands on the highest service reservoir, conjoined with the reservoir of the Warren Farm Schools, and, instead of obtaining a duplicate water-engine, the Committee propose to avail themselves of the present pumping power at Lewes Road. There will then be the guarantee of water being always put into the highest reservoirs, and an opportunity will be secured of ascertaining which is the more economical plan of raising the water.

Your Committee recommend that they should be empowered to borrow the sum of £13,500, to be expended under their direction in carrying out the works suggested by Mr. Easton.

On behalf of the Committee,

Sept. 10, 1878. (Signed) W. H. HALLETT, Chairman.

The following is the report of Mr. Edward Easton, C.E., referred to above:—

To the Water-Works Committee of the Brighton Town Council.

Gentlemen,—In accordance with your instructions, I have had careful experiments made to ascertain with accuracy the capacity of the existing mains to perform the work now required for the proper supply of your district.

In order that you may fully appreciate the results obtained, it will be necessary to put before you the present condition of the undertaking, so as to form an estimate of the probable future requirements of the Corporation.

To enable me to do this, I have had further accurate trials made of the quantity of water pumped, the amount of daily consumption, and other data, and I have appended to this report a series of tables giving fully the results of all the investigations.

The number of services attached to the mains at the beginning of the year 1878 was 21,195, and if it is assumed that the number of people, exclusive of visitors, will average about six to a house, it follows that a population of a little under 130,000 are now being supplied from the water-works. To this, in the full season, must probably be added not less than 30,000 visitors.

In 1872, when the Corporation took possession of the Company's property, the number of services was 17,555. In the six years, 1872–1878, the ratio has been as nearly as possible 20¾ per cent., and, judging from the last year's augmentation, it would not be safe to reckon upon a less ratio for the coming six years, so that in 1884 it will be necessary to provide a supply of water, and proper means of storing and distribution, for not less than 190,000 people, including visitors.

It is satisfactory to see that the number of intermittent services is gradually decreasing.

Careful measurements of the actual quantity leaving the reservoirs, show that the total number of gallons supplied to the population in the month of March of this year was 2,741,000 daily, which during the autumn months would probably be increased to 3,400,000.

The whole of the supply is drawn from wells and tunnels in the chalk, and thence raised by steam power into covered service reservoirs. There are two distinct series of works, one on the east and one on the west side of the district. Each consists of a pumping-station, and of three zones of supply mains and pipes, fed from three reservoirs at different levels. These reservoirs are connected by the service-mains in each zone, so as to make use of the pressure to the fullest extent. There is also a fourth service on the eastern side of the town for the supply of the workhouse, race-stand, and other parts of the district requiring water which cannot be reached by the high service.

The pumping-stations are one at Lewes Road on the east, and one at Goldstone Bottom on the west, with the exception of the highest service last mentioned, which is performed only by the Lewes Road works. There are pumps attached to all the engines, which perform the service to all the three zones simultaneously. There are two engines at each station. At the Lewes Road the two engines working together are sufficiently powerful to supply the whole town in from 12 to 14 hours, whilst those at Goldstone could do the same duty (exclusive of the highest service) in from 10 to 12 hours, and were the mains in each service of the proper size, the whole town could actually be supplied, as far as power is concerned, from either pumping-station. But in a very dry season the quantity of water obtainable from the Lewes wells falls short of the maximum requirements of the district, and as, for a variety of reasons, it is not desirable to attempt to extend the tunnels at that station, the last extension of the Goldstone Bottom works was determined upon by the Council, and carried out by the end of 1876, with the very gratifying result that at least 5 million gallons can be daily pumped in the dry season, or sufficient, according to the present rate of consumption (including the visitors), for upwards of 32,000 services, or more than 50 per cent. in addition to those now laid on.

An investigation of the amount delivered from the different reservoirs proves that in neither the high, middle, nor low services are the mains of a size to enable the water to pass freely from one side of the town to the other; whilst there is no means of supplying the highest service at all from Goldstone Bottom.

In order to ascertain with accuracy the cause of this state of things, I had gauges fixed to the mains of each of the three services, and accurate observations taken of the pressures indicated thereon for every hour of the day and night. The conclusion which follows from a careful consideration of all the facts adduced, is that in the centre of the town, as regards high and middle service, and at Goldstone Bottom as regards low service, the mains, which for the most part have been laid for many years, are so small that it is impossible, either by pumping under a moderate pressure or by gravitation, to make the water flow properly through the entire system.

To remedy these defects, I beg to recommend:

1. That a new main out of the low service reservoir be laid so as to increase the flow to Cliftonville and west end of Brighton.
2. That new mains be laid in the high and middle districts, of such a capacity that with a loss of head of not more than five feet, as much water shall pass from one reservoir to the other as shall suffice to keep up the supply.
3. That arrangements be made for pumping the water for the highest service from Goldstone Bottom, as well as from Lewes Road.

Low Service.—The great defect in this service is, that the only means of conveying the water away from the reservoir is by a 12-inch pipe of a great length, the friction through which is very considerable. I should recommend that a 15-inch pipe be laid from the reservoir at Goldstone Bottom, down Hove Drove, as far as Clarendon Villas, for a distance of about 600 yards. This must be in a tunnel just as the 12-inch is now laid. From the end of this pipe a 10-inch should be laid along Clarendon Villas, Blatchington Road, and down the drive to join the present 10-inch in Church Road.

I have had very careful calculations made, based upon the facts ascertained by the gaugings, and find that, to obtain the object in view, it will be necessary to make the following additions and alterations to the high and middle services.

Middle Service.—A 15-inch main should be laid from the end of the 18-inch on the Upper Shoreham Road, along that road, and down New England Hill, to join the 18-inch and 12-inch at the Race Hill Inn. The 10-inch now laid in a tunnel from the Islingword Road reservoir towards Park Hill, which is almost useless from its being laid at too flat a gradient, should be taken up and relaid from the junction of the 18-inch and 15-inch in the Upper Shoreham Road, to join the 8-inch in the Western Road. The 10-inch highest service pumping main will also be available, as hereafter explained, for this purpose. A new 12-inch main should be laid from Race Hill Inn to Church Street, a duplicate pumping main, 12 inches in diameter, should also be laid from the Goldstone Bottom station to the point before mentioned, where the present 18-inch and the new 15-inch will be connected.

High Service.—The reason of the want of flow in this service is, that, although the main from Dyke Road reservoir on the one side is 15 inches diameter, and that from Race Hill reservoir is 15 inches, the connecting-pipes from Race Hill Inn to Seven Dials are only 9-inch and 8-inch. A 12-inch pipe should be laid to supplement these.

Highest Service.—The capacity of the high-service pumps is very much in excess of the demand, and the middle-service power is proportionally less than the requirements. I therefore propose to make use of some of this surplus power on the high service, by performing the pumping of the highest service by means of the difference of pressure between the high and the middle service reservoirs on the east side of the town. The maximum daily consumption on the highest service is, at present, not more than 15,000 gallons, exclusive of the supply to the Warren Farm Schools.

To provide for this and other possible demands, I should make each of the water-pressure engines capable of raising 100,000 gallons daily.

The pumps under the two engines at the Lewes Road will not then be required, and the 10-inch main leading from them to the highest reservoir can be taken up and used for the low or middle service.

I estimate the cost of the works above described as follows:—

Low service—					
1500 yards 15-inch main, at 25s. 6d. per yard	£1,912	10 0			
Extra for 600 yards tunnel	300	0 0			
600 yards 10-inch pipe, at 13s. per yard	390	0 0			
700 yards 10-inch relaid, at 6s. per yard	210	0 0			
Cocks and connections	150	0 0			
			£2,962	10	0
Middle service—					
2650 yards 15-inch pipe, at 25s. 6d. per yard	£3,378	15 0			
2820 yards 12-inch pipe, at 16s. 3d. per yard	2,291	5 0			
1710 yards 10-inch pipe, taken up and relaid, at 6s. per yard	513	0 0			
Bends, branches, and sluice-cocks	500	0 0			
			6,683	0	0
High service—					
1530 yards 12-inch main, at 16s. 3d. per yard	£1,243	2 6			
200 yards 12-inch, taken up and relaid, at 8s. per yard	80	0 0			
Cocks, branches, &c.	150	0 0			
			1,473	2	6
Highest service—					
A pair of water-pressure engines, with connections, and a house for same	£1,200	0 0			
2420 yards 6-inch, at 6s. 3d. per yard	756	5 0			
Bends, branches, &c.	43	15 0			
			2,000	0	0
			£13,118	12	6
Ten per cent. for contingencies			1,311	17	3
			£14,430	9	9

When these works are carried out, the service of the whole town can be managed from Goldstone Bottom, as well as from Lewes Road works, and thus the splendid supply existing at the former will be properly utilized.

Looking at the facts mentioned in an earlier part of this report, that the Lewes Road works now barely supply the larger of the two engines in a very dry season, and that the tunnels there could be extended only at a very great expense, whilst at Goldstone there exists a very large surplus; considering also that the mains in the town have many of them been down a great many years, and are therefore not adapted to the present requirements, and certainly not to the future; and that the present price of iron is as low as it is possible for it to be, I have no hesitation in recommending you to press strongly upon the Council the necessity of carrying out the whole of these works with as little delay as possible.

Alderman HALLETT moved that the recommendations contained in the report of the Committee should be approved and acted upon. He said he

did not think that he need occupy the time of the Council long in referring to the recommendations, because the reports very fully set out their object. He might state generally that the original pumping-station of the Water Company was in the Lewes Road, and ten or twelve years since another station was founded on the west side of Brighton, at Goldstone Bottom. The system of pipes was first laid from the Lewes Road, and was from time to time extended, as occasion required on the western part of the borough, the pipes becoming smaller and smaller as the system was extended. Having works at Goldstone Bottom more powerful than those at the Lewes Road they should be able to pump into larger pipes, instead of which they had to pump into smaller ones, and therefore they had to use 300-horse power engines to do the work of 150. This was occurring at the present time. They had plenty of water and plenty of engines, and, instead of having smaller, they required larger pipes at this station than at Lewes Road. The communication should be so equalized that whether they chose to pump from either one or the other the water would flow freely, and the engine would not have to do double the work that it should do. He thought the report contained so much of the essence of the question that the Council would be willing to give the Committee their confidence.

Alderman MARTIN seconded the motion.

Mr. BOOTH said he considered it satisfactory that the Committee had no intention of enlarging the Lewes Road works. The argument made use of by Alderman Hallett he did not quite agree with. There were small pipes laid down, and then large engines were put at Goldstone Bottom, and now they had this given as a reason for the pipes being made larger. It would have been more satisfactory to him if Mr. Hallett had told them the necessity of having large pipes for the use of the town generally. He did not speak for the purpose of offering any opposition to the report, for he was quite satisfied, and the decision arrived at not to increase the water supply at the Lewes Road quite compensated for the very large outlay recommended by the Committee.

Alderman ABBEY explained that, as usual in engineering, the mains were made smaller as they went farther from the station. In the meantime, another pumping-station was made with larger engines—as large as there was a necessity for—at Goldstone Bottom. Desiring to equalize the system, and to make one pumping-station supply the east, west, north, or south, it was necessary to use the mains, and then the difficulty arose of having to pump into the smaller end first. The smaller pipes had been laid down a long time previously.

Alderman HALLETT said that at the Seven Dials, Dyke Road, there was a 7-inch main. This was big enough in the days when Brighton ended there, but 12-inch mains had been laid down since, and any stranger, when he was shown the plans, would easily see the original source of the supply from the diminished size of the pipes at certain places. The report itself contained many reasons, and gave the results of pressures, and surely it was impossible to furnish any further information. The rearrangement was very necessary, even from the Committee's own view, without their Engineer's advice. The reservoir on the Dyke Road supplied the high service of Brighton, and the Islingword Road reservoir did the same. They were put at the same level within one or two feet, and were intended to balance one another. If the pipes were large enough, the water in the Dyke Road reservoir would rise to the same level, but because of the smallness of the pipes it would not do it. They might pump and pump, and fill the Dyke Road reservoir, but the water would not pass to the other, not even if they gave it all night to do so. This was what Mr. Easton proposed to provide against, and when the pipes at the west end were made of a sufficient size, the water might be pumped into the high service reservoir on the east of Brighton, or *vice versâ*, and if a few hours were given they would balance one another.

The MAYOR observed that really the pipes were so small that they throttled the water so that it could not pass.

The motion was then put and unanimously adopted.

LOCAL GOVERNMENT BOARD INQUIRIES.

THE PURCHASE OF THE ILKESTON GAS-WORKS.

On Tuesday last Mr. S. J. SMITH, C.E., Local Government Board Inspector, attended at the Town Hall, Ilkeston, to hold a public inquiry on the subject of an application made to the Local Government Board by the Local Board of Ilkeston for sanction to borrow £30,000 for the purchase of the Ilkeston Gas Company, and for works of gas supply.

The gas-works had long been carried on by a private company; but a petition, signed by the principal owners and ratepayers of the parish, was forwarded to the Local Board, praying them to take the gas-works into their own hands. The result was that, on the Gas Company applying to the Board of Trade for additional powers, they were opposed by the Local Board; but while the matter was before a Committee of the House of Commons an agreement was come to by which the Company agreed to sell the works to the Local Board for £25,000, together with the law expenses which had then been incurred. The whole of the gas undertaking now being in the hands of the Local Board, they applied for a loan of £30,000 to purchase and carry on the works; to consider the advisability of granting which the present inquiry was held.

Mr. W. LISSETT (Clerk to the Local Board) having read the notice convening the meeting, said that not knowing the *modus operandi* at such inquiries he had not prepared any evidence, but he thought that if there was any objection he would be able to bring witnesses.

The INSPECTOR said it was usual in such inquiries for the applicants to first state their case.

Mr. LISSETT said that the question of the purchase of the gas undertaking was pressed urgently upon the Board by the ratepayers and gas consumers in the town, who, in August, 1876, presented a petition to the Board. That petition was signed by over 150 of the most respectable inhabitants, and prayed that the Local Board might take steps to secure the gas-works in order that they might have control over the same and be the means of giving a better and more economical supply of gas to the district. Previous to this, complaints had been made of the quality and quantity of the gas supplied by the Company. In November, 1876, the Company gave notice to the Local Board of their intention to apply to the Board of Trade for a Provisional Order. The result was that a special meeting of the Board was summoned, and they decided almost unanimously to oppose the application. The room on that occasion was well filled with ratepayers and property owners of the town, and after hearing explanations from the Chairman, other members of the Board, and himself, it was agreed to oppose the application, there only being one person in the room who made any opposition, and one person who demanded a poll of the parish. A poll was therefore taken, and with the marvellous result that out of 1497 persons, 261 voted against the Local Board taking the works, and 1226 in favour, thus showing the feeling of the parish. The application was opposed, but notwithstanding that they produced good evidence, an order was made, as the Board of Trade did not think they were justified in refusing it. While the question as to the confirmation of the Order was being discussed by a Select Committee of the House of Commons, an agreement was made, the Local Board deciding that they would give £25,000 for the undertaking, and pay £500 for the law expenses. All that, however, was not done rashly or without good advice from Mr. G. W. Stevenson, of Westminster Chambers; and it was through his advice they came to the terms they did. The next step was to ask the Local Government Board for a confirmation of the purchase and powers to supply the district with gas. A meeting was therefore held on the 2nd of June, and a resolution passed—"That application be made to the Local Government Board, asking the said Board to sanction, under the Public Health Act, 1875, section 162, the purchase of the Ilkeston Gas-Works undertaking at the sum of £25,000, and the payment of £500 towards parliamentary expenses incurred by the said Gas Company in the promotion of the Provisional Order by the Board of Trade, which order was withdrawn when before a Select Committee of the House of Commons in June, 1877." At the same meeting it was also unanimously resolved that the money which was required to complete the purchase of the Gas Company's undertaking should be entirely secured on the general district rates; that the Local Government Board should be informed that in the first instance the Local Board desired the loan of £26,000 sanctioned to pay for the undertaking and conveyance, and law expenses connected therewith; that the Board should ask the Local Government Board to recommend the Public Works Loan Commissioners to advance the money at 4 per cent. for a period of three years, at the expiration of which period the fund accumulated as a sinking-fund be supplemented by a new loan, to make up, with the sinking-fund, the sum of £26,000, which should be used to pay off the loan; and that as soon as the Board got the Company's works in their hands they should set about maturing their scheme.

The INSPECTOR asked what the other £4000 would be required for.

Mr. LISSETT, in reply, read the following letter:—

"4, *Westminster Chambers.*

"To the Ilkeston Local Board.

"In reply to your letters, I may say that several matters connected with the gas-works require to be radically altered before the gas can be made economically. The iron retorts must be abandoned and clay substituted. A small engine and exhauster and boiler must also be put in, and also a washer for extracting ammonia from the gas. Outside the works the mains, services, and other matters require overhauling. On reference to my proof for the Local Government inquiry, I see that my estimate for putting the works of manufacture and distribution in order was £4000, bringing the total cost of the undertaking, including the cost of the Order, to £30,000. (Signed) "G. W. STEVENSON."

The INSPECTOR said this letter was of importance, because it showed what repairs were necessary, and thus accounted for the other £4000. The Local Government Board treated the application as one for £30,000, but when the scheme was in operation, the Local Board would have to send plans showing how the £4000 had been expended.

Mr. LISSETT said there was another thing which the Local Board required, and that was that the full term of sixty years should be given for the repayment, because it would make a considerable difference in the instalments which they would have to pay.

The INSPECTOR said that was the limit, and it would be for the Local Government Board to say whether it should be so or not.

Mr. LISSETT said the Local Government Board had already sanctioned the loan of £23,650 to the Local Board. Of this sum £17,050 had been already actually borrowed for the erection of street-lamps and offices, and for getting plans, £2387 13s. 4d. had been repaid, and the present amount owing by the Board was £14,662 6s. 8d. The population of the town and immediate locality was estimated at 13,000, spread over an area of 2540 acres. The rateable value of the district was £31,008. The Board had agreed to raise the loan on the security of the rates of the district, and all clear profits arising from the sale of gas would be added to the general district fund, and would lessen the rate.

After some discussion, the INSPECTOR said the loan, if granted, would be not to make the Board a trading company that they might profit thereby, but if sanctioned it would be with a view to benefit the town, by securing a better and cheaper supply of gas. By referring to the Provisional Order it was found that the minimum price at which the Board were to supply gas was 3s. 6d. per 1000 feet, the maximum price being 8s. It was expected that the price would be a medium one.

No direct answer being given to the question as to the proposed loan exceeding the value of the gas-works, the INSPECTOR declared the inquiry finished, and said he would duly report to the Local Government Board.

THE WATER SUPPLY OF ABINGDON.

The Urban Sanitary Authority at Abingdon having applied to the Local Government Board for leave to borrow £10,000, for the water supply of the Borough, Mr. JOHN THORNHILL HARRISON, C.E., Local Government Board Inspector, held an inquiry at the Council Chamber, Abingdon, on Wednesday, the 4th inst.

The INSPECTOR opened the proceedings by reading the notice convening the meeting.

Mr. BAILEY DENTON produced plans of the proposed scheme, which he explained in detail. He stated that the water to be supplied would be obtained from Wootton boring, being supplemented from the springs above. They had had gaugings made of the two sources, and there was no doubt that during the summer the quantity of water had been considerably reduced.

Mr. GOWER stated that in December, January, and February, with slight variations, the supply of water from the sources indicated had been 170,000 gallons per day. The minimum in March was 150,000 gallons. In April, May, and June it varied from 100,000 down to about 70,000 gallons. In July it fell to 45 gallons per minute. The minimum in August was 60,400 gallons.

Mr. DENTON explained that this supply could be supplemented by the Park Spring, the water for which could be used for special purposes, but not for drinking, though it was not unfavourable for that. It could be used for many purposes, such as watering the streets. It yielded 20,000 gallons per day. It rose up in the town, and therefore, if not absolutely impracticable for drinking purposes, it was sentimentally objectionable.

The INSPECTOR inquired what was the estimated volume of water required by the town.

Mr. DENTON replied ten gallons per head per day for all purposes, reckoning the population at 6000, but in order to make provision for the future, the proposed supply must be much increased. This could be done by running headings into the well above the bore-hole, which was at the meeting of two or three runs of water, indicating that there must be an overflow from above. They would also get more by boring down as long as they could get water.

Further details having been given, as to the size of the pipes to be used, and also as to the extent of the reservoir,

The INSPECTOR asked if the fire-cocks and hydrants which were to be put up would supply the town in case of fire.

Mr. GOWER replied that they would do so in the lower parts of the town, but in the higher portions a fire-engine would be required as well.

The INSPECTOR asked if there was any objection to the proposal to sanction the loan of £10,000 for carrying out these works.

Alderman PAYNE said he had no objection to make to the proposal, because he should be extremely glad, for his own part, if the town could

obtain a sufficient supply of water from the hill; but he had been always very sceptical on that point, because he knew that even the stream which supplied Sandford Mill was, in a very dry time, extremely short of water; and as this was one of the proposed sources of supply, or of additional supply, to that which came from Boarshill, he felt he should like to ask Mr. Bailey Denton whether he thought the minimum of 60,000 gallons per day was sufficient to supply the town. The next question he wished to put was how much Mr. Bailey Denton thought this spring would be lowered by the continuance of dry weather for two successive seasons.

Mr. DENTON said these were, no doubt, very pertinent questions. He had felt in a position of great responsibility; but considered, from what passed in the Council when he was there, that they would be satisfied with a supply per head of a very moderate character. It had been frequently expressed to him that the town would be satisfied with a less quantity than he suggested, if it could be got from higher ground by gravitation. He suggested the quantity which was ordinarily given—25 gallons per head for the population—which was a very different thing from what was now spoken of; but he thought that, if 10 gallons per day could be secured, it would be sufficient, and Mr. Harrison expressed an opinion something like that when he was here last year.

The INSPECTOR said in his house they used, for all purposes, about 7 or 8 gallons per head per day.

Mr. DENTON said that although he did not agree that 10 gallons per head per day was all-sufficient, still, in deference to the opinion of others, he believed they would be able to secure 60,000 gallons by supplementing what they now had by what they could get from the heading.

Alderman PAYNE said he should like to know what would be the effect upon the springs of two or three dry seasons, because he did not want to put up these works and then by-and-by be laughed at because no water came down from the hill.

Mr. DENTON thought it was very possible that, taking the minimum outflow at 60,000 gallons, it would be reduced to 45,000. That was his opinion; it was but an opinion, and if uttered by any one else it would be but an opinion.

Alderman BALLARD pointed out that many householders would be supplied from springs on their own premises.

Alderman PAYNE said he put the question to Mr. Denton because he thought that all the springs at the present time were giving more than double their usual quantity.

Mr. DENTON replied that, perhaps, this might be so at the present time. His own experience supported the view that as the days declined from the longest day the springs became lower.

Alderman PAYNE asked Mr. Denton if he thought it best, seeing that they were not quite satisfied as to the supply being plentiful, not to build a reservoir at present, but to make it a sort of tentative scheme.

Mr. DENTON replied that he had considered whether they might not so contrive their delivering-main from the reservoir to the town, that it might be used as a rising-main from the river to the reservoir at any future time, instead of having to provide a service reservoir. This was, of course, in the event of their being compelled to go to the gravel-bed at the side of the river, from whence they would derive water in inexhaustible quantity.

Alderman PAYNE explained that his idea was that if they deferred the erection of a reservoir for the present, they would have sufficient water to flush the sewers of the town; and, in case the supply proved a failure they would not have spent all their money upon it.

Mr. DENTON said that the various rises of water must be taken into consideration. Water must be provided for extra occasions.

The MAYOR said that his idea had been altogether opposed to Mr. Payne's in that matter. He thought the reservoir they proposed erecting was too small rather than too large.

Alderman PAYNE explained that he was not referring to the extent of the reservoir, but he thought that, if the supply proved insufficient, their £1500 worth of brickwork would be lying idle, and would be of no use to them in the future.

The INSPECTOR pointed out that in a dry season the one compensating arrangement was a reservoir for the storeage and preservation of the water.

Mr. DENTON said that, for his own credit's sake, he must state that it was a very close run, and he thought it possible that the town might be very tightly served indeed. But the supply might be supplemented, first by the Park Spring, and then by headings, so as to get as much as he had always understood it was the wish of the town to have.

Alderman PAYNE asked Mr. Denton if he, as an Engineer, recommended the Council to adopt the scheme he had prepared.

Mr. DENTON said he wished to remind the Council that his prejudice, if he might so term his judgment, had always been for using river water, taken from a gravel bed, which would render it perfectly acceptable from a hygienic point of view. But he had yielded his own preference, in that respect, to the wish of the town to get the water from Wootton rather than from the river. He certainly did not prefer it, but believed that the wishes of the town might be answered by what it was now proposed to do.

Mr. PARSONS asked whether Mr. Denton, from his past experience, could give any idea how long in the year a minimum supply might be expected from these springs.

Mr. DENTON said the information obtained by the gaugings of this year was upsetting accepted theories on the subject of water supply from such sources. There had been a very sudden depression, and again a rise, early in the season. He always expected the springs to increase up to the longest day—that as the days lengthen the springs strengthen. He never yet found any contradiction to the proverb; but in watching the gaugings in the present case, he found that there was almost a sudden depression, and then a sudden rise, showing that this water-bed was influenced by the rainfall rather more rapidly than was generally the case in subterraneous water-beds. Therefore, he did not think he could give any positive answer to the question.

In reply to Mr. J. T. Morland, Mr. DENTON said that, always bearing in mind his own preference, and remembering that the river supply was inexhaustible, though there was a prejudice against the water, believing that it would not be found as good as other water, he did advocate the construction of a service reservoir on the spot indicated by the plan, to answer for the upper water, or for the river water.

Mr. PARSONS asked Mr. Denton's opinion as to the number of months in the year when they might expect only the minimum supply.

Mr. DENTON thought it probable that they might suffer a very considerable diminution for two months in the year.

Mr. PARSONS inquired if it would be possible to increase the supply by running headers into the springs above where the gaugings were now being taken.

Mr. DENTON thought so; but whether it would be very considerable or not he did not know, because it must be borne in mind that the water, particularly where it came out of the earth and sank into the earth again, really ran down to the coral rag, from which the Boarshill was supplied, so that if headers were run into the springs, it would only be "robbing Peter to pay Paul." Water was being taken from above, which went into the coral rag, and came out again.

The MAYOR said he was perfectly certain that the quantity of water that came out of the spring at Boarshill, close to the spring itself, was probably four times the quantity of the water where the gaugings had taken place.

Mr. DENTON was not prepared to endorse the Mayor's remark, but it was certainly more.

The INSPECTOR inquired if that had been taken into account.

Mr. DENTON replied that it had not.

Some conversation then took place on the subject of sewer ventilation, and shortly afterwards the inquiry terminated.

RIVER POLLUTION BY SEWAGE AT SOWERBY BRIDGE.

Mr. JOHN THORNHILL HARRISON, C.E., Local Government Board Inspector, held an inquiry in the Town Hall, Sowerby Bridge, on Wednesday, the 28th ult., in reference to the pollution of the Calder by sewage.

The Sowerby Bridge Local Board had applied to the Local Government Board for an order declaring that the third section of the Rivers Pollution Prevention Act, 1876, shall not be in operation until the expiration of a period to be limited in the order, so far as regards the discharge of sewage matter into the River Calder along any channel belonging to the Local Board, and used and constructed at the date of the passing of the Act for the purpose of conveying such sewage matter. Hence the inquiry.

Mr. BARSTOW (Clerk to the Local Board) said he would make a short statement as to the peculiar position of the district, and the grounds upon which it was necessary that a considerable period of time should be allowed for the purpose of adopting some scheme for preventing the fouling of the River Calder, as well as the tributary stream flowing into it within the district. The Local Board did not dispute that the river was fouled to a considerable extent, and they were quite alive to the necessity of adopting some scheme, as soon as a proper and practicable scheme could be found out. When the Local Board were formed in 1856, the sewerage was very defective. At that time there was only one outlet for the sewage of the easterly part of the district, which went into the River Calder. It was found necessary to make very extensive additions to the sewerage, and the middle part of the town was naturally sewered to the same outfall. Another sewer was constructed for the westerly part of the district, and that sewer was taken to an outfall at the slaughter-house, which was then about to be erected, the sewage being conveyed into the Rhyburne. The cost of these works was paid entirely out of current rates; no loan was obtained for it. At that time, no doubt, much less sewage went into the river than there did at present. Not only did this arise from the very large increase in the number of houses in the district, but the general adoption of water-closets, and so on, had contributed to the material which partly fouled the river. The locality of the district was very peculiar. It was situated between hills, and this rendered it difficult to adopt any scheme for preventing the fouling of the river. Sowerby Bridge was situate in the middle of the stream. The populous parts commenced at Todmorden, something like twelve miles distant, on the upper part of the stream. Hebden Bridge, which was another large and populous place, and Luddenden Foot, which was of considerable extent, and mills and other works on the upper part of the stream, also contributed to the fouling; and the Local Board considered that a remedy should be applied to the upper part of the stream before they could in fact do anything.

The INSPECTOR said he could not accept that theory. If the Local Board wanted the towns above to purify the stream they could show them the way. If the stream was purified at Sowerby Bridge, the Local Board there would have good grounds for complaining of the places above.

Mr. BARSTOW said there was every disposition on the part of the Local Board to purify the stream as far as concerned the district, but they had a difficulty in adopting an independent scheme which might afterwards prove almost abortive, or money thrown away, in a manner similar to what had been done at other places. They naturally wanted time to mature a proper scheme by which they would expend their money to a good purpose. Although the Board had not borrowed any money for the purpose of sewerage, they had had to borrow to a very large amount for other purposes. On loans there was money still unpaid to the amount of £24,000. The population of the district in 1858 was about 5000; in the middle of 1877 it was 7891. The rateable value in 1877 was £34,903 19s. In 1864, the Board established a system of water supply, for which they borrowed at various times a very large amount under a private Act.

The INSPECTOR said he had nothing to do with that.

Mr. BARSTOW said that of the money borrowed for that purpose there still remained £7912 unpaid.

Here it was elicited, from various members of the Board, that the annual loss on water account was about £600 per annum—last year it was £585 10s. The quantity of water used last year was over 66,000,000 gallons, of which about 700,000 gallons per month were used for manufacturing purposes. About two-thirds of the population used the water, and the consumption per head was some 30 gallons per day.

The INSPECTOR said the Board might take example by Soothill Nether, which had its water from the Halifax Corporation. Every gallon taken was paid for by meter, and they knew exactly what they used. The quantity used, including manufacturing purposes, was only about seven or eight gallons per head per day.

Mr. BARSTOW said that for street improvements in 1875-6 the Board borrowed £10,300, and £7971 was still owing. During the present year the Board had borrowed for the purpose of public baths £5000, and for public offices, for the business of the district, £2000, making the total of £24,688 still unpaid. £14,591 of that was the existing debt under the Sanitary Acts. The interest of that and the expenses of the district amounted to a rate of 3s. in the pound, and this in the present state of trade, which was not likely to improve for years, was a very serious burden upon the ratepayers. If they were to adopt a scheme for the district, they did not know what scheme to adopt. They had consulted no Engineer, except their own Surveyor, and his opinion was that the cost would be something like £10,000. The great portion of the pollution arose outside the district.

The INSPECTOR said he had seen the two streams as they came into the district, and they were fairly pure.

Mr. BARSTOW said the fouling of the streams principally arose from the manufactories.

The INSPECTOR said he had nothing to do with that on this occasion, but simply the sewage which it was acknowledged the town discharged into the river.

Mr. BARSTOW said they did not dispute it, but considered that if they got rid of their own sewage, and the same thing was not done by other Boards higher up the stream, they would be nearly as badly off as they were now, so far as the health of the district was concerned, because their sewage went away from their own district.

The INSPECTOR said they did not ask for any order. The Council were now liable to certain pains and penalties under the Rivers Pollution Act. They applied to the Local Government Board to protect them from these for a certain time. The question for him was in what time they could reasonably make arrangements to divert the sewage from the river and cease this pollution, and that was the point on which he should require evidence.

Mr. BARSTOW said he was instructed by the Local Board to lay these facts before the Inspector, showing the burden at present upon the ratepayers.

The INSPECTOR said that was not the point he had to look after, and he did not know whether the Local Government Board would take any notice of it. This was a question of interference with the ordinary action of an Act of Parliament, and the Local Government Board would not be willing to interfere with that Act further than was absolutely necessary. He thought the Local Government Board would probably grant time for the Local Board to look about to engage competent Engineers, and prepare plans and estimates for the works. This might be three, four, or six months, but that was the limit of time, as far as he could see at present, that the Board would grant an order for, unless there were good reasons to the contrary. In other cases the Local Government Board had granted, on his recommendation, that the Local Boards should have, in similar cases to this, six months to prepare the plans and estimates, and determine what they were going to do. If at the end of the six months the Local Board came with a scheme and asked for sanction to borrow money to carry out the works, then, on evidence as to how long it would take to complete them, the Local Government Board would grant a further extension of the order, which they could do without another inquiry.

Mr. BARSTOW said it was the intention of the Board to adopt a scheme as soon as they could see their way to expending their money for a permanent purpose; but the system of getting rid of sewage was now indefinite. The systems must be adapted to the locality; and, considering the great experience and information of the Local Government Board, he was sure the Board would be glad if they could suggest some scheme which would be suitable to the nature of the district.

The INSPECTOR said it was not for the Local Government Board to suggest anything. There were plenty of cases in all directions from which information could be gained as to how sewage should be dealt with.

Objections against the proposal were then submitted.

The first by Mr. LIPSCOMBE, land agent to Mr. Henry Savile, the largest proprietor on the Calder, was as follows:—"My objection to any but a limited suspension of the operation of the Act is based upon the fact that, for a great number of years prior to the passing of the Act, the Local Boards all along the valley of the Calder did expect an Act to be passed prohibiting the further pollution of the river. Mr. Savile is the principal riparian owner at Elland, the town next below Sowerby Bridge on the river, and in dry seasons the condition of the river is most offensive, and loudly calls for a prompt remedy. Any further delay is therefore to be deprecated."

The only other one was submitted by Mr. ARMYTAGE, as agent for his father, Sir George Armytage, Bart., of Kirklees. It was—"My objection to any but a very limited suspension of the operation of the Act is based upon the same grounds as Mr. Lipscombe's. Sir George Armytage is the owner of three miles of frontage of the River Calder, a few miles below Sowerby Bridge, and also the owner of a fulling-mill, for which clean water is essentially necessary, and he deprecates any further delay in carrying out the powers of the Rivers Pollution Act by the Sowerby Bridge Local Board, or any Sanitary Authority in the district."

After the evidence of Mr. Smethurst, the Surveyor to the Local Board,

The INSPECTOR asked if the Local Board would give him an assurance that they would set to work in good earnest; if not, he had better hear the evidence which could be brought forward by the Aire and Calder Navigation Company and others. He suggested that the Local Board should meet at once, and pass a resolution that they would take immediate steps to get the opinion of a competent engineer, and plans and estimates for the work. This was only valuable as showing that they meant to do something. They asked for five years, which was an absurdity. The Local Government Board would see about them having time enough to carry out the scheme.

The members then retired to do as the Inspector suggested. There were nine present out of the twelve who constitute the Board. On their return,

Mr. CLAY (the Chairman of the Board) announced that they had unanimously passed this resolution, which would be presented to a full Board meeting for confirmation:—"That the Board has for some time past been quite decided that some mode of dealing with the sewage of the town without fouling the river should be adopted, and now hereby decide that prompt steps be taken, by engaging competent engineers to prepare plans for dealing with the sewage."

The INSPECTOR then said he should recommend the Local Government Board to grant six months for the preparation of plans and estimates, and for the Local Board to apply for their sanction for a loan. He told the Board to make the application as soon as ever they could, and added that, on evidence being given of the time required for the completion of the works, he should recommend the time to be further extended, so as to enable the Board to carry them out.

In case they could not purchase the land, the time would be further extended until a Provisional Order for getting the land was obtained. That was exactly the case at Wigan, where they had now advanced to the stage of carrying out the works. Six months, he thought, would do for the first stage at Sowerby Bridge.

The inquiry then terminated.

THE ELECTRIC LIGHT IN PARIS.

Mr. John Reid, of the Edinburgh and Leith Gas Company, writing, under date of the 14th inst., to the *Edinburgh Daily Review*, says: "In common with thousands of visitors to Paris this season, I was greatly interested in the splendid electric illumination of the Avenue de l'Opéra which has been maintained for the last few months, and given rise to much speculation as to its bearing upon the future of gas and other artificial modes of lighting. While there can be no doubt regarding the magnificent effects produced, there has been much difficulty in arriving at anything like reliable information as to the cost of its production and maintenance as compared with gas lighting. By the favour of a friend, I have received a copy of a very interesting letter published recently in New York from Professor Silliman, who has been to Paris, and gives a very clear report of his opinions on the whole subject. I have no doubt if you can find room for the Professor's letter it will be read with great interest by thousands of your readers on account of its scientific as well as its social bearings."

Paris, July 27.

All the world, meaning Paris and her guests—have seen the magnificent illumination by the electrical lamps of Jablochkoff, unless, indeed, they have been so blinded by excess of light that they have seen nothing. A walk up the Avenue de l'Opéra of a dark night, from the Palais Royal to the Grand Opera House, or in the Orangeries of the Garden of the Tuileries, or along the shops of the Belle Jardinière, or by the Arc de l'Etoile, will dazzle the strongest eyes with the splendour and penetrating intensity of the great globes of opaline glass which temper the insufferable solar glare of the unprotected light.

I never see these beautiful globes without being reminded of that familiar class-room experiment of the chemical laboratory, when phosphorus is burned in a glass sphere filled with oxygen, and the critical point arrives when the whole glowing space is filled with the burning vapour of the volatilized phosphorus, and the blaze of glory for the moment seems above the brightness of the sun. So in these electrical lamps the same impression is made, save that the seconds of duration for the phosphorus are extended to hours for the electricity.

Objects viewed by the electrical light are seen in their natural colours, and such is the effect of refraction and reflection in producing a general diffusion of light that no deep shadows are seen, as was the case when only a single focus of unblenched electrical light was employed.

The lamps are set so high that there is no occasion to look at them, except the fascination of the thing while yet the effect is a novelty. The whole street, to the tops of the loftiest houses, is ablaze with a flood of beaming light, which makes the streets seem like the scenes of some grand play at the opera.

Let the question of priority of invention, of superiority in form of construction, and of conflicting claims among all the inventors rest for the moment; the grand and simple fact remains, that, given any adequate source of mechanical motion and masses of soft iron, properly mounted for revolution and armed with an adequate amount of insulating copper wire, we come from the simple multiplications on itself of that inconsiderable amount of magnetic force which exists in most soft iron, developed by simple rotation of the bobbins of such an apparatus, to such a volume and intensity of magneto-electricity as is limited only by the power of the mechanical motor at command, and by the inductive capacity of the soft iron masses within the environment of the insulated wires of soft copper, provided the revolution of the arbor is accompanied with suitable interruptions in the direct flow of the electrical stream.

Without the use of technical language, and of good diagrams, which would be of little value without technical description, we can hardly make the subject more easy of comprehension to the average reader. What is the result? Consider the Gramme machine, for example—for we are in Paris, and the Gramme machine is, unfortunately, the only light-producing magneto-electric apparatus on exhibition. Weston has his machines here for electro-plating, doing excellent work; but Wallace is not here, nor Brush, of Cleveland, and so America remains literally in the dark, when she should have made a most conspicuous show of electrical illumination — only one more example of our too numerous shortcomings at this Exposition.

But to return to the Gramme machine for our illustration. It is simple, powerful, and very compact. It has no delicate parts liable to derangement; it can be set up anywhere in a few hours, without any foundation, and it can be worked for months without delay or interruption. Like any other machine of simple rotation, the wearing surfaces need lubrication. It occupies only a space of about 4 cubic feet, weighs about 400 lbs., of which the copper bobbin weighs about 70 lbs., and has a diameter of 7 inches, and requires 2½-horse power to drive it, with 850 turns per minute. Such a machine develops an average illuminating power of about 5700 candles. Its intensity depends on various circumstances of position, &c., and may vary between 2400 candles and 8400 candles, according to the mode of placing the carbon points with reference to the photometer. This is the type of the machine in use for industrial purposes, for practical daily work in the illumination of shops, railways, and streets.

There is in the Exposition a form of the Gramme machine at work, which yields, on the authority on M. Fontaine, three times more light for equal quantities of matter in action than any of those which have before been tried in France, England, or elsewhere. This machine weighs 441 lbs., costs £60 (300 dols.), and yields a light equal to 30,000 candles! Notwithstanding its low price and wonderful performance, this machine cannot be commended for use, as the elements of durability are wanting in it. But of the form of the Gramme apparatus used in shops, it is affirmed that several hundred of these machines have been at work all the past winter, some of them without interruption, for underground operation, without costing a farthing for repair or maintenance, except for lubrication. In the great foundry of Ducommen and in the shops of Sautter and Lemonnier these machines have been constantly at work for four years without giving the slightest trouble.

I quote from a carefully-prepared statement of Messrs. Heilman, Ducommen, and Steinlen, the average cost per hour of four Gramme machines which have been run by them in their shops for four years. The charge for interest and depreciation is rated at 15 per cent. on the cost of four Gramme machines and the motor to drive them, viz.:—

Carbon pencils burned	8·36d. sterling.
Steam consumed	3·42 ,,
Attendance	2·85 ,,
Interest and depreciation	48·45 ,,
Total cost per hour	63·08d. sterling.

In this case the moving power is only about a twentieth of the total cost, while three-fourths of the total is put to interest and depreciation. The parties whose results we have quoted estimate that the cost of an equal amount of light from gas to that supplied to their establishment by these machines would be double. But the question of relative cost involves many considerations, and must vary with circumstances, and especially with the cost of gas, which in this case is estimated at 7s. 6d. (1·75 dols.) per 1000 feet. In Paris the cost of gas is the same to the private consumer, say 30 centimes per cubic mètre. The cubic mètre is, in round numbers, 35 cubic feet; consequently, the cost of Paris gas in American currency is 1·75 dols. (say 8·57 frs.) per 1000. But the city pays only half that sum in consideration of the monopoly, and of their having an equal share in the earnings of the Company after a certain sum—say 10 per cent. on the original capital—has been paid to the stockholders.

I am informed by M. Alphonse Barlet, the Engineer in charge of the Belgian railways, that he has installed four electrical lanterns, with the old style of regulator, in the *gare* or station of the Bruxelles Railroad, at a total cost of 20,000 frs. (say 4000 dols.) for one Gramme machine, one 8-horse power steam-engine, eight regulators—two to each focus of light (*foyer*)—and all the necessary conductors, &c. These four electrical lamps take the place of 120 gas-burners (*becs de gaz*), each consuming 150 litres (4½ cubic feet) per hour. The light now obtained from these four electrical lamps M. Barlet estimates equal, at least, to what would be got from 500 such burners as he used before. But for a comparison of cost the statement is made between the 120 burners actually used before and the electrical costs, with the general results, that in the long nights, when the use of the illumination is for six to eight hours during about seven months of the year, the electrical light is cheaper than gas. But in the summer, with only two or three hours use of the light, the electrical costs more than the gas light. The reason is obvious. The wages of the Engineer and the Electrician are the same in both cases, and the interest on cost the same for the shorter as for the longer duration of the light. But, on the whole, the electricity was the cheaper, and the light abundantly more than the gas gave. On the other hand, the Northern Railway Station in Paris, which was illuminated by the electrical lanterns, has returned to the gas.

I remember well the excitement occasioned by the first appearance of the electrical light in the well-known sunrise scene of "Le Prophète," at

the Grand Opera House at Paris, in 1846. The regulator then used was devised by M. Deleuil, a well-known instrument maker of Paris, but his form of the regulator was soon replaced by that of Duboscq, which is an apparatus found to-day in nearly every physical cabinet.

In all forms of regulator before the Jablochkoff candle, the unequal march of the two carbons had to be provided for by a mechanism which advanced the positive carbon twice as rapidly as the negative, so that the focus of light remained (or was intended to remain) constant. All forms of the regulator were destined primarily for the voltaic arc, and the difficulty of manipulating two carbon pencils was common to all forms of the apparatus. These difficulties have been in a great degree overcome by the ingenious device of the young Russian officer, M. Jablochkoff, who, by simply placing the two carbon pencils side by side, and insulating them by means of a thin plate of some refractory substance placed between them, has dispensed entirely with all forms of regulating apparatus.

Those who have not seen this very neat little contrivance will understand it if they consider a common lead pencil reversed—*i.e.*, its two wooden halves are the carbons, and the central lead is the insulator, only this insulator completely separates the two carbons in all their length. This pencil, or candle, as it is well called, is held in a pince or vice of metal, the two jaws of which represent the two electrodes. At the upper end of the pencil is a narrow bridge of carbon which completes the circuit, and, like a match, is inflamed by the first impulse of the electric current, thus immediately setting up the ignition. After that, the arc itself is the conductor, and the light streams out with its well-known brilliancy. Four of these pencils, or candles, are mounted in each of the glass globes, and so arranged, that they are ignited successively as each one is consumed, the time for each being from one and a half to two hours, according to the thickness of the carbons. The light is not absolutely uniform. There are the well-known variations familiar to all who have experimented with the electrical light, and the violet rays which are so fatiguing to the eyes are often visible; and, as will be seen by this statement, the duration of the light is limited at present to eight hours. This last limitation can be probably removed by mechanical improvements, which it is needless to dwell on here; and the use of globes, in which uranium oxide is employed to give its feeble fluorescent tint, will absorb completely the violet rays, without injury to the brilliancy of the illumination.

But, taken as it is with all its defects, and abating at discretion the too favourable statements of those who are interested parties, we must all agree, who have seen it here in Paris, that it is the wonder of the occasion; and that is saying much, for there are some other wonderful things here, of which, perhaps, the great balloon is the freshest novelty. But the use of the Jablochkoff candle involved the necessity of a novel construction in the Gramme machine, and in all other magneto-electric machines of a constant current in one direction. The reason is obvious. The positive carbon is consumed twice as fast as the negative, and this would be fatal to the use of the famous "candle." This difficulty could be met only by producing an alternating current, and this has been successfully accomplished by M. Gramme in his new machine. This has been easily reached by the use of a small magnetic machine, supplemental to the illuminating engine which acts as a commutator, and which effects, at a velocity of 800 revolutions, a reversal of polarity—alternation of *plus* and *minus*—64,000 times in a minute. By this simple device the Jablochkoff candle burns with entire uniformity.

At this moment there are three models of the Gramme machine with alternating currents. The first supports 16 Jablochkoff candles of "100 becs"—*i.e.*, of an intensity each equal to 100 gas-burners—consuming five cubic feet of gas, and yielding each 20 candles power. It may be safer to rate these burners at 15 candles, which would be the same as saying each Jablochkoff globe equals the light of 1500 candles. But this is not what is meant by the statement here. It means that one such electrical lamp extinguishes 100 gas-burners; but it is claimed that the actual intensity of light provided is equal to much more than that, as M. Barlet states in his experience in the Bruxelles Railway Station. This first model of the Gramme machine requires an engine of 16-horse power to drive it, and costs with its motor 10,000 frs.—say, 2000 dols. It weighs 650 kilos.—say, 1500 lbs., and makes 600 turns per minute. The whole weight of copper induction wire in action is 103 kilos.—about 125 lbs. The second machine is good for six Jablochkoff candles, requires 6-horse power to drive it, and costs with its motor 5000 frs.—say, 1000 dols. It revolves 700 times per minute, and weighs 280 kilos. The weight of copper wire in action is 40 kilos. The third form of apparatus feeds four Jablochkoff candles of 100 becs each, requires 4-horse power to drive it, and costs with its motor 3500 frs.—say, 700 dols. It revolves 800 times a minute, and weighs 190 kilos., having 28 kilos. of copper wire in action. From this statement it appears that 1-horse power is estimated for each candle of Jablochkoff, or each 100 gas-burners.

M. Gramme is now occupied on a fourth model, which is to feed two electrical lamps, and is much cheaper both in cost and driving power. The Holmes machine and the Gramme machine are alike in the relative position of the bobbins and the electro-magnets, both being alternating currents. By the simple substitution of a plate of plaster of Paris for the kaolin at first used for the separation of the two carbons, M. Jablochkoff has, it is claimed, doubled the intensity of the illumination, without any increase in the electro-motive force, and the cost of the apparatus has been reduced from 75 centimes to 50 centimes per hour for each electrical candle—100 becs—motive power and depreciation of the apparatus not included.

I cannot conclude this letter without reverting to the splendour of the electrical illumination of the new Avenue de l'Opéra, as seen from the balcony of the Grand Opera. The effect is magnificent, and at this moment there exists nothing in this city of splendid effects to be compared to this magical scene. The surroundings of the Opera itself—the most majestic theatre in the world—no doubt add much to the effect. There are in view about 30 of these electrical lanterns—a part of those near the Opera House being of the same form (a cone inverted) used by the Paris Gas Company, the others being the opaline globes already described. The vista is about two-thirds of a mile, and the effect incomparably finer than any show of artificial illumination ever before seen. It is the light for all public places where a high degree of illumination is desired, as in large shops, cafés, public gardens, theatres, avenues, &c. But it will not displace gas for domestic use, nor for common street-lights. Great difficulties in the subdivision of the current are yet to be overcome. For the Avenue de l'Opéra, I understand, there are three steam-engines, and that at present 200 mètres is as far as the current is conveyed.

But let us not too confidently predict the future of what is possible in this direction. Of one thing we may be certain—the Parisian Gas Company are wide awake to the public interest in this thing, and will not be slow to add it to their present vast system of works whenever it appears that both their own and the public interest make it desirable they should do so.

But in Paris the use of gas in houses is a matter of much less moment than in America, for the old prejudice excludes gas both in London and in Paris, to a great extent, from domestic use; candles, and Carcel lamps burning colza oil, still shine in all the *salons* in Paris. When, then, we learn that the share of profits paid over to the city from their one-half interest in the earnings above 10 per cent., first paid to the Shareholders Association last year, amounted to the round sum of 8,000,000 frs., we can readily understand that the city will act with the Company in aggregating any valuable improvement in public illumination to their existing franchises, and that they can well afford to do so, even at a pretty round price. The present capital of the Gas Company is, in shares, 84,000,000 frs., and in debentures, 111,745,000 frs., or, in the total, nearly 200,000,000 frs., or 40,000,000 dols. The modest little capital of 7,500,000 frs. which the Electrical Company represent would be only as dust in the balance to such a huge monopoly.

It is interesting to note that the amount paid last year by the city of Paris for gas was 7,827,205 frs.—a little less than the dividends received from the Company. But it must be remembered that the tax paid into the city treasury by the Gas Company last year was 8,500,000 frs., and that the several Water Companies paid a little more than that—viz., 8,924,577 frs. By this shrewd arrangement the city of Paris annually gains net, over all costs for gas, more than 8,500,000 frs. When will the several Gas Companies in New York combine to pay the city as much for their monopoly? Probably not in the fragment remaining of this century.

THE LIGHTING OF OUR WAYS AND HOMES.

[From the *Newcastle Daily Chronicle*.]

"Is there anything whereof it may be said, See, this is new? It hath been already of old time, which was before us." The abodes of men—their homes and ways—were lighted up in the ancient time, in methods of their own. Even that great thoroughfare and theatre of the nations, the sea, had its illumination. Generations prior to the Christian era, Alexandria had its Pharos for the guidance of the mariner; although the electric flame, thrown over our northern waves from Souter Point, was unknown to the lighthouse that overlooked the Mediterranean. The ancients had their night-lamps by land and water, as well as the moderns. But the fashions of the world are ever changing; the same object is sought after, through the ages, in varying ways; and strangely Protean is the panorama of human life, from the historic dawn whose glimmerings we can but faintly discern, down to the age in which man travels by steam in lighted rooms along roads of iron.

We will not wander abroad—will not quit our little island—in the pursuit of our present purpose. Within the small compass of our own country, we may read the shifting story of Artificial Lighting—the lighting of street and home when the sun has deserted the heavens. When the Parliament of England was legislating for the burning of heretics, in the reign of the hero of Agincourt, the burgesses of London were clubbing their candles for the alleviation of winter darkness. A year or two before the final mayoralty of Sir Richard Whittington, Sir Henry Barton was issuing an order from the civic chair to the citizens of London, one of whom (John Stowe) has a note of it in his annals. "Lanthornes with lights" were "to be hung out in the evenings betwixt Allhallowstide and Candlemas." And as on the Thames so it also was on the Tyne. The burgesses of Newcastle were enjoined—if not continuously, in fits and starts, as the times were more or less troublous and insecure—to fix a light over their doors, to unmask the wrongdoer and for the comfort and assistance of the honest wayfarer. In the State Papers we come across the wintry gloom of our forefathers on the eve of the great civil war of the seventeenth century. It was a seething season of agitation and excitement. "Civil dudgeon" was "growing high." There was a war of opinion abroad ere the sword had yet been drawn. The Press was in active motion, and its products were sown broadcast over the land. In the earlier days of February, 1639, books flavoured with "sedition" were flung at night, by unseen hands, into the open shops of the burgesses of Newcastle, then (and long afterwards) destitute of glazed windows. "Brought out of Scotland by the running post," they were cast out of the darkness to the counter of the tradesman, standing at the receipt of custom with his "dip" of tallow or his lamp of oil; and at open doors the printed missiles were thrown in. Cautious citizens consigned their copies to the Mayor, and the anxious authorities sent them to the Bishop of Durham, to Archbishop Laud, and to Secretary Windebank. In so portentous a period, it was not unfitting to require the householders of the town to burn night-lights in front of their several abodes. Systematic street-lighting there was none, from the Tweed to the Thames. Not until the Plantagenet monarchs had had their day, and the Houses of York and Lancaster, of Tudor and Stuart, were all gone, and the second king of the House of Hanover was on the throne, had London its Lighting Act. It had its lamps after a murky kind; and Gay has described for us the streets of the City thus lighted in the time of Queen Anne. Faint "oily rays" do their best, in the poet's picture, to pierce the night; and "the officious linkboy's smoky light" lends its feeble aid.

> "While in long rank a train of torches flame,
> To light the midnight visits of the dame."

Lumbering along in her closed sedan, footmen stalk with flambeaux by her curtained windows, "where a dim gleam the paly lantern throws."

As in Pall Mall, so in the West Gate and the Bigg Market. Only in the days of Anne, the "paly lantern" had not yet glimmered for the illumination of the streets of Newcastle; where, till of recent days, the extinguisher of the chairman's flambeau lingered in the palisades of some stately mansion, eloquent of a generation whose glories were departed. In the time when the sedan chair was a familiar institution, there was also to be witnessed, in "the dark, uneven, ill-paved" (or unpaved) ways of Newcastle, the scene depicted as to Glasgow in the "Rob Roy" of Sir Walter Scott:—Nicol Jarvie, preceded to the Tolbooth by "a good-looking young woman, with grogram petticoats, tucked up for trudging through the streets, and holding a lantern in her hand." Have we not some of us seen, in place of the illustrious Bailie, a procession of fair ladies in pattens, picking their steps behind some blooming Mattie of English birth, carrying a tall lantern by her side, with its long mould candle in lofty pride! Each fashionable coiffure is protected in its toilet by a calash—a canopy of silk and wire sustained by two gloved hands, carefully preserving the head-gear from harm.

When the maid and her mistress clanked past us in pattens, their lanterns flitting along like some *ignis fatuus*, they had no help from luminous shops sending a blaze of splendour from both sides of the way. Before the accession of George III., not even an oil-lamp blinked in a Newcastle thoroughfare. In a November night of 1755, a pitman was slain on the unguarded streets; and then, in the ensuing month of December, "soldiers were ordered to patrol the town from ten till daybreak, to prevent disturbances." At this darksome period of our history, Newcastle had entered upon the pursuit of whales; and the whale fishery seems to have suggested to the popular mind the idea of oil-lamps. On the 7th of July, 1752, the church-bells were set a-ringing by the arrival in the Tyne of a ship laden with four whales. This great event of the day—the opening triumph of the Newcastle Whale Fishery Company—was followed by a proposal to light the town with 150 oil-lamps. But, like other improvements—like the similar project of our sires in 1717 or 1718—it had to wait. Its time came, however, at last. Parliament was asked, in 1762, for powers to "enlighten" the streets, and it gave consent. A Lighting

and Watching Act was obtained (3 Geo. III., cap. 55); and on Michaelmas-day, 1763, the lamps began to gleam, and the watchmen to go their rounds; and for half a century and more the lamplighters of Newcastle were trimming their wicks.

All this while, however, the oil-lamps of the kingdom were haunted by the "spirit of coal." If any one will turn to Mr. Samuel Clegg's volume of 1841 on "Coal Gas," he can see all about it. It carries us back to the year 1659, when Thomas Shirley was experimenting on a well near Wigan, whose waters were popularly supposed to be inflammable, for they "did burn like oyle;" but Mr. Shirley let the natives see that not the spring, but the gas issuing out of the earth associated with it, formed the fuel of the flame. So, too, in 1733, Sir James Lowther exercised his sagacity on the subtle product of a coal mine, whence bladders were filled; and a pipe being inserted in the neck, lighting by gas was established. The Dean of Kildare, Dr. John Clayton, who followed in 1739, devised for it the name of "the spirit of coal." This ingenious divine took a new step in advance—he was "one of the first who distilled coal in a close vessel, and burned the gas thus obtained from the bladders wherein it was collected."

The world moves on—now slowly, now swiftly. It may sometimes seem to stand still, yet is always in motion. In 1792 it began to stride. In this matter of coal gas, William Murdoch of Redruth, carried it forward at a bound. He lighted his Cornish house and offices; and on his way at night between his home and the mine with which he was connected, he took a bladder of gas under his arm, fitted with a tube, and walked along through the darkness in the light. He also drove a road locomotive by gas; and, on removing to Old Cumnock, Ayrshire, in 1797, he was not long in applying the new light to his new home. In 1798 he came to the Soho Works, at Birmingham, of Boulton and Watt, where his experiments were still prolonged; and at the Peace of Amiens, in 1802, when the war of the Revolution came to an end, and everybody was illuminating for joy, the Soho Foundry contributed its share of the general flame in the flagrant form of burning gas. In the ensuing year, Murdoch lighted up the cotton-mills of Phillips and Lee, at Salford, his pupil (Samuel Clegg, father of the Civil Engineer who writes the book before us) having already lighted the mills of Mr. Henry Lodge, at Sowerby Bridge. Mr. Clegg also introduced gas, in 1807 or 1808, into the Catholic College of Stonyhurst.

There was no longer any escape for oil from the rivalry of gas. The "spirit of coal," issuing from Lord Dundonald's tar ovens, had often fired spontaneously, impetuous for conversion to flame in the service of society; for Nature has ever been obtruding her powers and resources on the mind of man, growing sometimes impatient of the dulness of her purblind pupil. The ancients were oft-times startled by inflammable gases breaking forth from the earth on which they trod, and rushing into fire; for gas lighting "hath been already of old time, which was before us." It had long been chafing for possession of the public streets; and it was to have its way. The London and Westminster Company was projected; and the movement had about this time a fillip in the *Edinburgh Review*, an article appearing in the month of January, 1809, from the pen of Professor Pillans, who said: "During one of those excursions to the Metropolis with which we occasionally treat ourselves after a long period of northern rustication, our attention, at such a time alive to everything, was arrested by a new and singular spectacle. The whole range of Pall Mall, from St. James's to Cockspur Street, was lighted up [Jan. 28, 1807] by means of lamps fed with gas, instead of cotton and oil, and certainly in a style of much superior brilliancy. We found, upon inquiry, that the constructor of this remarkable illumination was a Mr. Winsor, acting under the auspices of a Committee of Subscribers, and that it was executed by them as a grand experiment to convince Parliament and the public of the national importance of their intended Light and Heat Company."

The Bill of 1809 was lost; but an Act was got in 1810, and the work went on. The "light without a wick" had been laughed at; incredulous comparisons of it were made to "clipped moonshine;" Lord Brougham, as he was once reminded by *The Times*, "bitterly ridiculed the projects of Winsor;" and Sir Humphry Davy inquired if it were intended to take the dome of St. Paul's for a gasometer. The conservative lamplighters, when Westminster Bridge was ready for their ladders at the end of 1813, refused to run from post to post; and Mr. Clegg, now Engineer to the Gas Company, had to do the lighting himself night after night. But St. Margaret's, Westminster, discarded oil in 1814, and led the way in that street-lighting by gas which was not to be hindered by incredulity or conservatism, however serviceable these sentiments may sometimes be. The Guildhall of London was lighted in the new mode on Lord Mayor's Day, 1815; and there were pens equal to the occasion, proclaiming "the mild splendour of the gas, shedding a brightness clear as summer's noon, but undazzling and soft as moonlight." Rapidly the radiance thus applauded made its way over the whole kingdom; the paid-up capital of the Metropolitan Gas Companies increasing from year to year until, in 1877, it had mounted up to £11,371,124, with a gross revenue of £3,577,335, and a profit of £1,116,439.

Newcastle was not tardy among the provincial towns in copying the example of London. It disregarded the cry of danger to the whale fishery, raised in the interest of oil-lamps, and applied to Parliament for a Gas Bill in 1817—exactly a century after the first recorded movement of the town for organized street-lighting. Gas was introduced into our houses and thoroughfares in the month of January, 1818. The oil-lamp was discarded, after a reign of five-and-fifty years; and now, when sixty other years have run their course, electricity is in the field, and claiming to share with gas in the work of public lighting. More than a quarter of a century has elapsed since Mr. Staite was discoursing to us on the electric light, and exhibiting its brilliancy on Sunderland Pier and the Keep of our Castle. Nor has it ceased, in all that time, to claim the attention of our countrymen and the world. In Europe and America it continues to solicit the eye with increasing power; and what may come of it, who shall say? The early years of the nineteenth century saw a revolution in the illumination of our nights, and its latter days may be destined to behold another. It is not for us to lift the curtain that hides the future. We shall not run the hazard. But doubtless, side by side with gas, electricity will find its spheres, whatever these may be. As our forefathers converted the tower and lantern of St. Nicholas, in the time of Queen Elizabeth, into an inland lighthouse, consuming "waxe maid in candell" to dispel the darkness of winter, so the electric sun may rain down its beams on square and place, and dockyard and railway station; and the dream may even be realized of its light streaming over the battle-field. Its time will come, and in confidence we await the advent. In the new comer, however, gas will have, not an opponent, but an ally; and the world will be richer for the more recent development.

"The old order changeth." Yes; but the old remains, and interfuses with the new. The "cresset" of a former age is not gone; and while we write, the ancient "brazier" that burnt with ruddy glow in long-gone nights, plays its useful part in our thoroughfares where the new tramroads are in course of construction. Man is conservative. In making new conquests he adheres to old achievements; and should the electric light befriend us to the utmost of its power, we have no expectation that it will "turn off the gas." The "light without a wick" is in no danger of being snuffed out.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district continues in a very unsatisfactory condition, and colliery proprietors all complain that business can only be done on unremunerative terms, whilst the pits can only be kept going about half time. There is still very little extra demand for the better classes of round coal suitable for house-fire purposes; and although there has been lately rather more inquiry from works for general manufacturing purposes, the demand from this source is much below the average, and so long as the iron trade continues in its present depressed condition, the common classes of coal will be difficult to move. With regard to gas-making coals there is little or nothing to report, as the season during which the majority of the contracts are given out is now practically closed. The quoted prices are unaltered from last week, and there is not much probability of any material change for some time to come. Where, however, business is forced—and this has to be done in many cases, owing to the necessitous circumstances of not a few of the small coal-owning concerns—extremely low figures have to be taken. The average quoted prices at the pit mouth are about as under:—Best Wigan Arley, with one or two exceptions, where 10s. per ton is still asked, 9s. to 9s. 6d.; common ditto, 6s. 9d. to 7s. 6d.; Pemberton four-feet, 6s. 6d. to 7s. 6d.; common coal, 5s. to 6s.; burgy, 4s. to 4s. 6d.; and slack, 3s. 3d. to 3s. 9d. per ton.

There is still but little doing in local-made cokes, the production of which has had to be greatly reduced in consequence of the absence of demand, and the keen competition of the north country makers for any business to be done here.

All classes of iron meet with very little demand for present requirements, and Lancashire makers of pig iron, who are altogether undersold by outside brands, are doing little or nothing. Manufactured iron is rather weaker, but although producers offer at prices which in many cases are below the cost of production, buyers only give out specifications very sparingly, and the majority of the works are short of orders. Lancashire bars delivered into the Manchester district are quoted at about £6 per ton, but there are sellers at a lower figure than this.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The gas coal shipments, as usual at this time of the year, are increasing for the coast and Mediterranean; but the Baltic and northern European ports seem to be fully supplied, and probably little more will be sent there this season. Gas coals are being shipped to France, for Paris and other cities. The exports of coals from all the gas shipping-places are steady. Shipping turns at the best collieries are somewhat lengthy—namely, about six colliery working days. All the best gas collieries are working up to full time. Prices are unchanged, and remain about 7s. per ton for best gas, and 6s. for inferior. The second-class collieries in the county of Durham are, as a rule, doing badly, but there is an improvement of business amongst the second-class gas and house collieries, though no alteration in prices. The steam coal trade is depressed. The orders for the better sorts are working off. The best collieries are doing a very moderate amount of work. Second and third class are faring badly. There is destitution amongst some of the miners families in Northumberland, and in the county of Durham it is proposed to reduce miners wages 10 per cent. Wages could not very well be lower amongst the second-class pits in Northumberland, as most of them are upon short time, and the amount of money drawn by the men at the fortnightly pay is poor indeed.

Freights coastwise continue to be firmer. More orders come into the market, and the rates have slightly improved. The last quotations have been;—Hamburg, £5 5s. to £5 10s. per keel; London, 4s. 3d., Havre, 5s. 3d. per ton. Coal rates to Cronstadt remain about £7 10s. per keel. Swinemunde, £5 15s. to £6; Copenhagen, £5 12s. 6d. to £5 17s. 6d. The homeward corn business never was more for steam shipping than it is this season, and there is an abundance of tonnage in the market everywhere, and likely to be.

The chemical market is extremely quiet, and prices are the same as last week. The lead trade continues in a depressed state. The following are the latest market quotations:—Pig lead, £16 10s. per ton; dry white lead, £23; red lead, £18; flake litharge, £19; copper, flat cake and ingot, £66 to £68; best selected, £72 per ton. The iron market continues depressed, with trade favouring the buyer. The importation of timber into the northern ports is limited. The timber trade is very much depressed.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

It is now expected that the very prolonged negotiations instituted by the Johnstone Police Comissioners for the transference of the local gas supply undertaking to the town, under the provisions of the Burghs Gas Supply (Scotland) Act, will soon be terminated. The arbiters have of late held several meetings, and the decision of Dr. Anderson Kirkwood, the umpire, is looked forward to with anxiety.

The latest movement for the adoption of the Act just referred to is about to be attempted in the city of St. Andrew's, the scene of the recent meeting of the North British Association of Gas Managers, as also the scene of the successful managerial labours of Mr. J. Hall, the Past-President of that Association. At the monthly meeting of the St. Andrew's Town Council, held last Wednesday, Bailie Ireland gave notice of a motion for the adoption of the Act.

In proceeding to dispose of their profits made during the past year, the Arbroath Gas Commissioners have found themselves in a difficulty. They held their usual monthly meeting last Thursday, when it was proposed by the Provost that the sum of £100 should be voted to the Police Commissioners for the town improvement account, and that the balance should be devoted to laying out and improving the Abbey Green. Both he and his brother Magistrates had agreed upon that recommendation; but the Town Clerk interposed, and showed the Commissioners that they were under an obligation to the harbour creditors to lay aside £250 per annum out of the gas profits. A long discussion ensued on the subject, and it was eventually agreed to adjourn the consideration of the disposal of the gas profits till next meeting.

In Govanhill, the new police burgh in the southern suburbs of Glasgow, the provisions of the General Police and Improvement Act, in regard to the lighting of common stairs, are being rigidly enforced by the Magistrates. On Monday last no fewer than 18 tenants were summoned to the Police Court for failing to have the gas lighted on the stairs leading to their respective houses. Of that number 17 pleaded guilty, but in ignorance of the requirements of the Act. As these were the first cases of the kind brought before the Magistrates of the burgh, the Bailie dismissed them with an admonition, and warned them that if the matter was not immediately attended to they would be again brought up.

The thriving town of Markinch, in Fifeshire, although possessing a good supply of street-lamps, and getting its supply of gas for use in the same free from the Gas Company, is still labouring in darkness out of doors at night, from the fact that there has hitherto been no regular provision made for having them lighted. That condition of things is now in

the fair way to be remedied, a public meeting of the inhabitants having been held in the Town Hall last week, when it was resolved to get the necessary funds collected.

As affording some indication of the dulness of trade and the surplus of labour in the market, there was a notification given last Wednesday to the *employés* in the works of the Edinburgh Gaslight Company of a reduction of their wages to the extent of ½d. per hour.

Of late there has been a great improvement in the amount of water available for domestic purposes in the town of Ayr. However, the supply has recently been shut off from 7 p.m. till 7 a.m., and at the last meeting of the Town Council the Provost suggested that the use of the baths should be dispensed with for a fortnight or so. Rapid progress is being made with the new works.

The Water Committee of the Rothesay Town Council have arranged for a loan of £20,000 to pay for the works of the Rothesay Water Company, in November, at the rate of 4 cent. It is expected that it may ultimately be arranged to pay off the whole loan in 30 years, on payment of an annual interest of £5 19s. per cent., instead of the 4 per cent. payable on an ordinary loan.

On account of the recent water drought, the Engineer to the Greenock Water Trust, last Wednesday week, informed the sugar refiners of that town, whose motive power is obtained from sources under the control of the Trust, that, unless rain fell abundantly, the water supply for other than domestic purposes would be exhausted within 21 days. The refineries affected produce an aggregate of 2500 tons per week. It is nine years since a similar intimation was made to the customers of the Trust.

In connection with the new water supply for Edinburgh and district, works have now been executed to the amount of £240,000, on account of which, commission for the engineering has been paid to Messrs. J. and A. Leslie, to the amount of £1000. At the last meeting of the Water Trustees, Messrs. Leslie reported as follows on the progress of the works:—They stated that at Gladhouse reservoir there only remained some pitching to be done. The buildings of Gladhouse mill having been cleared away, the refuse removed, and the water first collected run off, there had been gathered, since the sluices were put down on the 7th ult., 290 million gallons, or above one-sixth of the full capacity of the reservoir. Portmore reservoir was completed, and of available water there had been collected 78 million gallons, or between one-fourth and one-third of the whole capacity. At Edgelaw reservoir, the embankment was expected to be commenced in about a month, and, on the site of the Roseberry reservoir, the survey for working plans had been completed. At the same meeting, it was resolved to impose a domestic water-rate, for the current year, of 6½d. per £1, being 1d. less than last year. Shops, &c., were assessed as before, at 2d. per £1, and the public water-rate was fixed at 1d. per £1.

The following are the rates of assessment for water just agreed upon by the new Water Commission for Perth:—Inside area, under the old Water Act, 1d. per £1 on proprietors of lands and heritages; 8d. per £1 on occupiers of dwelling-houses; and 4d. per £1 on occupiers of shops and business premises. Outside area—occupiers of dwelling-houses, &c., 1s. per £1; occupiers of shops, &c., 6d. per £1; and public water-rate of 1d. per £1. There is a slight increase of assessment on the inside area.

It has been resolved by the Parochial Board of Blantyre, as Local Authority, to form part of the parish into a special water supply district.

The Stirling Water Company have resolved to continues the rates of assessment the same as last year—namely, 6d. per £1 for the central district, and 1s. per £1 for the district outside the burgh boundaries.

A further sum of £5000 has just been obtained from the Public Works Loan Commissioners, on account of the new water supply works for the town of Galashiels.

The Glasgow pig iron warrant market has again been very dull, a decline of no less than 10d. per ton having occurred during the past week. Business was done on Friday down to 47s. 4d., and 47s. 4½d. cash, and 47s. 5½d. one month. The current of speculation is still in favour of lower prices, notwithstanding the very low point already reached.

A considerable amount of despondency is still showing itself in the local coal trade, but there is some improvement shown in the demand for house consumption.

Bristol Water-Works Company.—The Directors of this Company, at their usual fortnightly meeting, on Saturday, the 14th inst., resolved to declare an intermediate dividend, for the half year to the 30th of June, on the £25 and £20 (£12 paid) ordinary shares, at the rate of 10 per cent. per annum, and to make a payment of 2s. 6d. per share to the Proprietors of the £25 shares, on account of arrears of dividend. The warrants to be payable on Tuesday, the 15th of October, on which date the interest on the £6 and £4 10s. shares will also be paid.

Belgrano (Buenos Ayres) Gas Company, Limited.—On the 4th inst., this Company was registered, with a capital of £100,000 in £10 shares, for acquiring and carrying out certain concessions and agreements for supplying gas to the town and suburbs of Belgrano, province of Buenos Ayres. Power is taken to extend the operations of the Company to other places in the Argentine Confederation, or on the River Plate. The Articles of Association state that on July 2, 1872, a partnership was formed, under the name of the Belgrano Gaslight and Coke Company, for the purpose of working the concessions, &c.; and works have been erected for the purpose of carrying the same into effect. The present members of this partnership have agreed to form themselves into a joint-stock company, and to transfer to the Company the rights and liabilities of such partnership.

Sevenoaks Water-Works Company.—An extraordinary meeting of the Shareholders of this Company was held on Saturday, the 14th inst.—Mr. Lambarde in the chair—for the purpose of deciding upon the amount of new capital to be raised, the manner in which it should be raised, whether by the issue of debentures or new shares, and, if the latter, then the portion to be allotted to the present Shareholders. After the notice convening the meeting had been read by Mr. Hunter, the Secretary, the following resolution was submitted and unanimously agreed to:—"That in order to provide for the further extension of the Company's works, and to pay off accounts already owing, it is desirable to raise additional capital, and that the Directors be authorized to raise £12,000 by the issue of 600 shares of £20 each." It was also resolved that the new shares should be issued *pro ratâ* to the present Stockholders. This new capital is to be raised by instalments, 20 per cent. on deposit, and 20 per cent. in three months time, the further calls being left to the discretion of the Directors, so that the utmost that can be raised at first will be only about £4800, which will be as much as the Company will require for some time to come.

Register of New Patents.

2469.—Gubbins, R. R., and Whitestone, J., Upper Thames Street, London, "*Improvements applicable to valves for gas, water, or steam pipes, and in the means of cleaning and grinding the working faces of such valves, part of which improvements are also applicable for protecting parts of other machines or apparatus from injury by oxidation.*" Patent dated June 26, 1877.

The main objects of this invention are—1. That valves used for controlling the flow of gas, water, or steam through pipes should be so constructed that they should be less liable to damage or deterioration, by reason of oxidation, than heretofore. 2. That their working surfaces or faces should be capable of being cleaned with facility. 3. That the faces and seats of valves when worn shall be capable of being re-ground so as to render them water, steam, or gas tight, without the necessity of taking the valve to pieces for the purpose of regrinding the worn parts.

The invention is more particularly applicable to that class of valve in which the passage is closed by means of a circular disc, which is kept by any convenient means in close contact with an annular or circular face, on which it is capable of being moved or slidden to and fro for the purpose of opening or closing the passage.

The first part of the invention consists in turning or forming a groove or recess in the face or edge of the valve (which is supposed to be made of iron), and inserting therein a ring or strip of zinc, which must be firmly secured in place in such a manner as to produce perfect contact of the two metals. As one of these metals is electro-positive, and the other electro-negative, the effect of this contact will be that a continuous electric, magnetic, or galvanic action will be set up, and this will prevent, or very greatly reduce, the action of oxidation, even when the surfaces are exposed to conditions in which, under ordinary circumstances, very rapid oxidation is likely to ensue.

The second part has for its object to so construct the working parts of the valve that in working they may be made to scrape off and remove from the working faces any solid matters that may adhere thereto, and deposit such extraneous matters in a small chamber or receptacle provided for the purpose, and from whence they may be removed from time to time by simply unscrewing a small cover or lid adapted to this chamber. To this end the circular disc, which forms the moveable part of the valve, is so formed that it shall be capable of being rotated on its centre by means of a worm or screw, which takes into the teeth of a worm-wheel formed on the back or edge of the valve disc. One end of this screw passes up through a stuffing-box, made in the dome or cap of the valve, so that, by turning the screw from the outside, the valve disc may be rotated. The edge of the valve disc facing the seating is by preference made acute or sharp, so that, when the valve disc is lowered in order to close the opening or pipe, the acute edge will cut off from the seating, as with a knife or scraper, any solid matters that may be adhering thereto, and allow them to drop into the chamber or receptacle below. In order more thoroughly to cleanse the faces of the valve disc and its seating, a small opening or inlet is formed in any suitable place, through which a solvent or lubricating liquid may be introduced—this opening being provided with a screwed cap or plug to close it when not required to be open—so that when the valve disc is rotated by means of the worm or screw, any extraneous matters which may be between it and the facing upon which it is intended to rest or bear may be ground away the more readily, so as to make a tight joint when the valve is closed.

The third part relates to the means of re-grinding the worn faces of the valve without removing such parts or taking the valve to pieces, and is more particularly applicable to steam valves, the faces of which are very liable to be cut by the passage of the steam.

2476.—Wallace, R. W., Battersea, Surrey, and Claus, C. F., Great St. Helen's, London, "*Improvements in the purification of gas and the utilization of bye-products by the manufacture of secondary products therefrom.*" Patent dated June 27, 1877.

This invention relates to improvements in the purification of coal gas, and is a further development of the processes described in the specification of the present inventors former letters patents, dated Jan. 20, 1877, No. 272, and June 16, 1877, No. 2362.

They find that in addition to the purifying agents described in the former specifications, for the removal of bisulphide of carbon from coal gas, they can also employ solutions of sulphide of potassium and sulphide of sodium, either separately or mixtures of both.

They prepare the solutions of sulphide of potassium or sodium, for the above purpose, by decomposing the sulphates of potash and soda by means of sulphide of barium solution, or by heating (preferably by boiling) the solutions of the sulphates with fresh alkali waste, when this substance is readily obtainable; or by heating the sulphate of potash or the sulphate of soda, or a mixture of them, with an excess of carbonaceous matter enclosed in retorts or in reverberatory furnaces, and dissolving it out in water; or as described in the specification of letters patent, dated March 17, 1869, No. 819, or by any other suitable method.

For effecting the exposure of the coal gas to the purifying action of the solutions, they prefer the use of the apparatus or plant described in specification of the 1877 patent, No. 272, although ordinary coke towers or other means may be employed instead of that apparatus, but less advantageously.

As a further improvement, and as another part of this invention, they purify the gas from carbonic acid and bisulphide of carbon by exposing it in a series of towers, and in the manner described in the 1869 patent, to the action of solutions of sulphides of potassium and sodium, produced as above described or otherwise. The solutions of these sulphides are pumped from the towers (provided for that purpose) nearest to the gasholder, and through the series of towers towards that nearest the retort, whilst the gas travels in the opposite direction.

By the action of the carbonic acid on the gas, the solutions of sulphide of potassium and sodium are gradually converted into the carbonates of potash and soda, whilst sulphide of hydrogen is liberated.

The speed and the throw of the pumps are so regulated that, when the solution arrives at the last tower of the series, it is wholly or nearly converted into a solution of carbonate of potash or soda, when it is run off into plant separate from the gas plant, and then boiled down and calcined to form commercial alkalies, as described in the 1869 patent.

By the action of the bisulphide of carbon in the coal gas on the solutions of the sulphides of potassium and sodium sulpho-carbonate (or allowing for the simultaneous presence of sulphide of ammonium in the coal gas), sulpho-cyanide of potassium and sodium are formed; these may be separated from the solutions of the carbonates by any convenient method.

The sulphide of hydrogen liberated in the course of the above-described process travels forward with the gas, and enters another set of towers devoted to its separation. It is then decomposed either in the manner directed in the 1869 patent, or by the action of sulphurous acid, as described in the 1877 patent, No 272, forming free sulphur, which may be utilized for any purpose.

The towers employed for decomposing the sulphide of hydrogen are constructed of stone or stoneware—that is to say, they are similar in construction to muriatic acid condensers in alkali works, and filled with stoneware angle-pieces, stoneware balls, and tiles. The sulphide of hydrogen may, however, also be absorbed in hydrated oxide of iron purifiers as at present used, but the other method specified is preferred.

In the two 1877 patents, the inventors state that, in the course of the purification of gas by means of ammoniacal gas or caustic ammonia liquor, they obtain as the ultimate result solutions of carbonate of ammonia, and

it will be obvious that sesqui or bicarbonate of ammonia may also be produced in this operation.

2488.—Marshall, F. D., Cambridge Street, London, "*Improvements in the manufacture of gas and in apparatus therefor.*" Patent dated June 27, 1877.

The main feature of this invention is the introduction of carbonaceous oil and steam into the retort by means of an injector or jet apparatus. It is preferred to use crude petroleum oil, but other carbonaceous oils may be employed; and either ordinary wet steam or superheated steam, hot air, or hydrogen gas may be employed for injecting the same. By this method of introducing the oil by a jet of steam, air, or hydrogen, the oil will enter the retort in a very fine spray or vapour, and, coming in contact with the red-hot surfaces of the retort, will be immediately converted into gas of a highly illuminating value.

Any suitable or convenient injector or apparatus may be used for injecting the oil into the retort, but it is preferred to employ an apparatus somewhat similar to the ordinary feed-water injectors of steam-boilers. The nozzle of this injector is to be secured upon the exterior of the retort-lid, and the apparatus supplied with oil from a cistern or reservoir, arranged in any convenient position, the steam or other injecting fluid being supplied from a boiler by means of suitable pipes furnished with regulating valves or cocks.

This method of combining the oil with the gas may be employed in connection with any ordinary retorts, as at present existing in gas-works, but the invention comprises special forms of retorts and a mouthpiece.

The patentee constructs what he terms a right-angled retort, as follows, that is to say:—He constructs the same in the form of an elbow, its two ends being arranged at right angles, or nearly so, to each other. He also constructs a diaphragm retort, which has a cylindrical form, with a central division-plate extending from the mouthpiece nearly to the back of the retort. These improved retorts may be formed of either iron or clay. He employs two retorts, placed one above or higher than the other. In the lower one of these, the gas is produced in the usual manner, while the petroleum or other oil is injected into the upper retort, the latter being termed the oil-retort.

The improved mouthpiece is constructed in the form of a double mouthpiece, one part being attached to the gas-retort, and the other part to the oil-retort. These two parts are connected by a tube, which has an extension inside the oil-retort arranged in the direction of the length of the retort, and opening into the same. By means of this tube, the gas made in the lower retort ascends into the upper or oil-retort, and is there combined or mingled with the oil vapour, and is conducted away in any convenient manner.

2520.—Hopper, G. C., Southampton Buildings, London, "*Improvements in apparatus for lighting and extinguishing gas-flames.*" A communication. Provisional protection only obtained. Dated June 30, 1877.

These improvements consist in annexing to an ordinary gas-burner a small auxiliary burner or igniter in conjunction with a novel mechanism, by means of which, one or other of these two burners being previously lighted, it will ignite the other on the former being extinguished; thus by the act of extinguishing the main burner the auxiliary one is ignited, and will remain burning until it is desired to re-ignite the main burner. When such is the case, the auxiliary burner is thereby extinguished.

The mechanism consists in a small double conical valve, adapted on a hollow stem fitted vertically in the gas-pipe of the burner, and susceptible of occupying two positions—viz., raised when the gas is feeding the main burner, and lowered when feeding the igniter. To the lower valve is adapted a flexible membrane, whereby the gas is precluded from directly entering the gas-pipe, and which also serves to actuate the double valve.

Requisite motion is imparted to this double valve in three different manners, and by three different descriptions of mechanism, viz.:—By pneumatic pressure acting on the membrane; by the pressure of the gas acting on the membrane; or by the pressure of the gas acting on a bell dipping in liquid.

Pneumatic Pressure.—In this case an air reservoir is made use of, the air contained in it being compressed by any convenient mechanism when the main burner is to be ignited. The pressure produced by the air acting on the diaphragm of the valve causes the latter to rise, and thereby admit the gas through the hollow stem to the burner, at the same time closing the passage to the igniter by the application of the lower valve against its seating. So long as a sufficient pressure is maintained in the receiver, the main light will continue burning; but when the main light has to be extinguished, the receiver is relieved of its pressure, causing the diaphragm and double valve to fall, whereby the upper of the two valves closes on its seat, intercepting the flow of gas to the main burner, whilst the lower valve, falling from its seat, admits the gas to the igniter, which is ignited by the flame of the main burner previous to its extinction.

Gas Pressure.—According to this arrangement the pressure of the gas raises the membrane and double-cone stem, thereby feeding the main burner and excluding gas from the igniter; but the gas is admitted through a cock combined with a bye-pass, allowing, whether closed or open as regards the main burner, a small stream of gas to pass to the igniter, in such manner that, when the gas is turned off from the main burner, this auxiliary stream of gas passes through the vertical double valve feeding the igniter, whilst the main burner is extinguished. When it is desired to light the latter once more, on opening the cock, the pressure of the gas once more raises the double valve, thereby admitting gas to the burner and excluding it from the igniter; but previous to this action, or rather during this action, the igniter has communicated its flame to the main burner.

Hydrostatic Pressure.—According to this arrangement the membrane is replaced by a bell, attached to the double vertical valve, with the lower open end dipping in a liquid such as glycerine, which bell and double valve are raised by the pressure of the gas so as to distribute the gas to the main burner, and lowered by the effect of the diminution of the pressure, so as to allow the gas to flow to the igniter and exclude it from the main burner, before one or the other of these flames being extinguished, it ignites the other.

2583.—Henderson, G., and M'Neil, D., Blackfriars Road, London, "*Improvements in supplying, controlling, or regulating the flow of water or fluid, and in apparatus used therefor.*" Provisional protection only obtained. Dated July 4, 1877.

This invention, in the first place, refers to arrangements for ball-valves, which close by the pressure of the water on the valve. Secondly, to the arrangements for a valve to regulate the flow. Thirdly, to the regulating of the flow and supply to the pan of a closet, with an after-flush when the valve is dropped.

In carrying out the first part of the invention, the inlet for the water to the cistern is placed at the upper part of it, and the ball with the lever is made in the usual way, and weighted as required. The end of the lever carrying the ball, and furthest from it, presses against the lower portion of the valve, which rests on the seat in the case of the valve in communication with the inlet. To the upper portion of the case is secured a screwed portion, which regulates the rise of the valve; and the lever carrying the ball is provided with a link, which is attached by a chain to the outlet-valve on the piston.

The action is as follows:—When the link is pulled, the ball-lever is lifted, and this action also lifts the outlet-valve, the inlet-valve remaining shut, the water in the cistern being thus discharged through the outlet-valve. When the link is released, the outlet-valve is closed, and the ball drops, and by this action the inlet-valve is pressed up, and water issues into the cistern till the ball rises to its position and closes the inlet-valve.

In carrying out the second branch of the invention, a cistern is used with a double bottom. The lower cistern is provided with a seat, and on this seat, when in position and closed, rests a valve, which closes the communication with the outlet from the cistern. The seat has on its upper end a rod, which fits into an opening, free to move in a second rod, which is provided with a valve or washer working water-tight in a cylinder or case secured to the cistern. The cylinder or case is perforated near its upper part.

The action is as follows:—The chain or other arrangement is connected to the second rod or spindle. On this being pulled, it rises in the cylinder or case, and brings the washer or valve working in it above the perforations in the case, thereby closing the communication with the first cistern. The valve on the outlet-pipe is by the same action withdrawn from its seat, and the water in the second cistern passes through the outlet. When the valve falls it resumes its original position on the seat of the outlet, and at the same time the valve in the case or cylinder also falls. This latter action allows water to issue into the second cistern, and fill it through the perforations in the cylinder.

The third branch of the invention mainly consists of a valve possessing similarity of effect to the last described, but when fitted to a water-closet allows for an after-flush. The valve is provided with a spindle or rod, terminating in its upper part in a piston, working loosely in a case or cylinder.

The action is as follows:—The case or cylinder being attached, is pulled from its seat, lifting with it the outlet-valve. By the weight of the valve pressing the water out of the cylinder or case, it gradually drops on its seat again, allowing the regulation quantity of water to pass through. After it is released the case fills again gradually with water.

2644.—Haddan, F. W., Strand, London, "*An improved liquid or water meter, or water-power engine.*" A communication. Patent dated July 10, 1877.

The principal feature in this invention is a piston with reciprocating motion in a cylinder induced by the pressure and flow of the liquid or water through the apparatus, which it enters by a hollow piston-rod and inlet to the cylinder on one side of the piston, and quits by or through a hollow piston-rod and outlet from the cylinder on the other side, the communication between the two sides being established by certain passages in the piston itself, and controlled by valves actuated by or from the motion of the piston, and thus rendered automatic.

In practice it is contemplated in some cases to employ springs, or weights, or compressed air to work or to assist the action of the valves, and sometimes to employ latches or detents in combination with the springs, or weights, or air cushion.

Any convenient indicating apparatus will be employed to register the number of strokes made when the apparatus is employed as a water-meter, and may also be appended when used as a water-power engine.

2647.—Melling, T., Aigburth, Lancs, "*Improvements in water-meters or apparatus for measuring and registering the quantity of water or other liquid flowing through pipes or other conduits.*" Patent dated July 10, 1877.

This invention has for its object the measuring and registering of the quantity of water or other fluids flowing through pipes, &c., and consists in—

I. A measuring cylinder, with its piston and rod.
II. Two piston valves and the side pipes in which they are contained.
III. The gearing by which the said valves are worked.
IV. The clockwork for registering the quantity of water measured.

I. The measuring cylinder is truly bored, and has a branch upon it at each end to connect it to the side pipe, the upper branch communicating by a port cast upon the cylinder with the bottom end of the cylinder, and the lower branch also communicating by another port with the top end of the cylinder. The cylinder is provided with a cover at each end, one of which covers has a stuffing-box in it, through which the piston-rod works. The piston is formed by two cupped leathers, or it may be of other suitable construction.

II. The valves for regulating the admission of the water to, and its expulsion from, the ends of the cylinder are two in number. They are of the "piston" kind, formed by a cupped leather in each, the pressure of the water against the leathers keeping them tight. These leathers are protected by metallic guards on both their faces. The two valves are connected by a hollow rod or tube, through which the outlet water from the upper valve passes, the top end of the tube being perforated for that purpose between the upper piston valve and the attachment of the tube to the valve-spindle. The outlet water is, therefore, always on the outer faces of the two piston valves; and as the inlet water is introduced between them, and of course also presses equally on their inner faces, they are consequently always "in equilibrio," and that of the most perfect kind. The side pipe is a plain cylinder, truly bored at both ends where the valves work. It is connected at one end to the outlet-pipe, and in the middle to the inlet-pipe. It has also a cover at one end, with a stuffing-box in it for the valve-spindle to work through. To form the connection between the side pipe and the ends of the cylinder, instead of the ordinary oblong ports, the side pipe is perforated with round holes of small diameter, which open into two annular chambers around it, the metal intervening between these small holes, with the metallic guards, serving to protect the leathers of the piston valves in passing over them. These chambers have branches upon them, which are connected to those on the cylinder.

III. The valve gearing consists of—

(*a.*) A cam lever, which is raised and depressed by the piston-rod. This lever is of the bell-crank form, having at right angles to it a heart-shaped cam. On the upper part of the heart-plate (or cam) at right angles to the plane of its face, and on the opposite side to the lever, are two projecting studs, which are below, and their centres parallel to the centre line of the lever when seen in "side view."

(*b.*) A weight lever, one end of which carries a roller that bears against the heart-shaped cam, and the other a weight, which works the valves. Its centre is fixed below that of the cam lever, and on one side of it.

(*c.*) A double-ended valve lever, which works loose on the same fixed centre as the cam lever, and the ends of which are raised alternately by the projecting studs on the cam, which are below it. One end of this lever is connected by a valve-spindle to the tube passing through the valves, and the other end carries a weight to counterbalance that of the two piston valves in the side pipe.

(*d.*) A standard affixed to the cylinder cover for carrying the levers.

IV. The clockwork, by which the quantity of water measured is regis-

tered, is actuated by the piston-rod or valve-gearing, and, together with the gearing, is enclosed in a suitable casing.

The mode of working is as follows:—The piston being at the bottom end of the cylinder, and the two piston valves at the highest point of their stroke in the side pipe, the under side of the piston will be open to the inlet-pipe, and its upper side to the outlet-pipe. The inflowing water will then enter the cylinder under the piston, and force the latter upwards. In its ascent the piston-rod (by a suitable preparation upon it) will, at any point, come in contact with the cam lever and raise it, the cam at the same time depressing a roller on the weight lever, and raising the weight until the point of the heart (or cam) bears upon the roller, when the weight will instantly descend, causing the roller to run up the other curved side of the cam, and thereby completing the stroke of the cam lever, and changing the valves; or, more briefly, one-half of the motion of the cam lever (both in the up and down strokes of the piston) is effected by the piston-rod, the other half by the weighted lever; the latter half only acting upon the valve lever and valves. For, as the projecting studs on the cam are so arranged that the one which is about to act upon the valve lever does not come in contact with it until the point of the heart is upon the roller, the changing of the piston valves is effected instantaneously by the descent of the weight, not by the movement of the piston-rod.

The instantaneous changing of the valves, that is thus effected when the point of the heart reaches the roller, also ensures perfect uniformity in the length of the stroke of the piston, and consequent accuracy of measurement; and as the valves and side pipe are so arranged that one valve must be closed before the other is or can be opened, and as the valves are constructed on a principle that ensures their being perfectly tight, there is no possibility whatever of any slip (or passing of water unmeasured), either in changing the position of the valves or at any other time, nor of their being fraudulently tampered with to allow the water to pass unregistered, the meter thus becoming a dead block to the passage of water, unless the piston works.

The down stroke of the piston is effected in a similar manner to the up stroke, and a quantity of water corresponding to the capacity of the cylinder having been thus measured by an up-and-down stroke, the piston is ready to re-ascend.

The registration is effected by clockwork of the description usually employed in meters, such clockwork being actuated either by the piston-rod, valve-rod, or one of the levers.

In the construction of the meter, the upper valve regulates the inlet and outlet of the water to and from the bottom end of the cylinder, and the lower valve answers the same purpose for the top end of the cylinder; but, to dispense with the ports required by this arrangement, the upper valve could, by a suitable modification of the gearing, be made to serve for the top end of the cylinder, and the lower valve for the bottom end, and that without any variation from the principle described, either for the valves or their gearing.

2659.—Rennick, C., Queen Victoria Street, London, "*Improved apparatus for lighting and extinguishing gas.*" A communication. Patent dated July 10, 1877.

This invention relates to a device for automatically lighting and extinguishing street, station, hall, and other gas-lamps at any desired time, without the necessity of visiting the lamps oftener than required for cleaning the same, when the device is wound up, regulated, and set in the proper manner. The device is securely attached by suitable clamps or other fastenings, to the gas-pipe and burner of the lamp.

In carrying out this invention, a clock train is supported between side plates that are fastened to, or cast in one piece with, the clamp. The clock train serves to turn an arbor, on which loose cams are placed, one cam moving by a sleeve or tube on the arbor, and the other by an encircling sleeve on the first-mentioned cam. These cams may be set on a recessed moveable dial, keyed to the arbor by means of arms and clamp-screws, and to a stationary dial of the side plate, so that one cam indicates the time when the lamp is to be lighted, and the other when it is to be extinguished.

The dials are graduated to 24 hours, as the device is intended to make one revolution per day.

The slots of a moveable dial admit the moving and setting of the cam arms after the fastening screws are loosened, the arms being secured again after they have been set, to admit the running of the device for the required time.

The cams engage spring-acted presser-rods, which slide in suitable guides of the supports, and extend to diametrically extending arms or spurs of the stopcock, one presser-rod serving to open the cock, the other to close it. The presser-rods move along the eccentric cams until they arrive at the notched part of it, when they are suddenly thrown by their springs downward, and produce thereby the opening or closing of the stopcock.

The presser-rod that turns on the gas is connected by a fulcrumed lever with a side piece that is guided sidewise of the gas-pipe, and extended nearly up to the burner, where a match receptacle is arranged in which a number of small matches are stored, and gradually fed forward to the action of the slide piece by a spring. The recessed upper end of the slide piece takes up one of the matches, and carries it up, by the sudden dropping of the presser-rod, so as to strike it against a friction spring, ignite the match, and light thereby the gas.

The matches may be provided with a small lateral groove, or the friction spring with a sharp top edge, to prevent the sliding back of the spent match, without interfering with the regular feeding of the matches.

The device may be wound and set once a week to the required time, which may be done when the lamps are cleaned, the match receptacle being filled at the same time, so that the automatic lighting and extinguishing of the device are regularly and reliably kept up as long as the clock train is running.

2664.—Paine, W., Anerley, Surrey, "*Improvements in liquid-meters.*" A communication. Patent dated July 10, 1877.

According to this invention, the lower part of the meter is formed with a case provided with an inlet at the lower part on one side, and an outlet at the upper part on the other side. Above this lower case is fixed a case enclosing the counting gear and dial, which case has no passage of communication whatever with the lower one. The dial and counting gear are thus completely insulated from the liquid to be measured, without the necessity of using packing for that purpose.

The measuring apparatus consists of a wheel or fan, formed of thin non-corrosive metal, the blades of which are set at an angle to a vertical plane. This wheel is mounted in suitable bearings, and is enclosed in a case or measuring chamber fixed to the upper case, and mounted centrally in the lower case. The measuring chamber has fixed on the exterior a horizontal ring or flange, which, in combination with a ring or flange, and suitable packing in the interior of the lower case, serves to divide the lower case or chamber into two parts horizontally, the lower part forming an inlet chamber to receive the water from the supply, and the upper part forming an outlet chamber to receive the liquid from the measuring chamber, and deliver it to the outlet orifice.

Below the flange, on the outside of the measuring chamber, are a number of holes, formed obliquely through the case of the chamber, so as to cause the inlet water to impinge in angular directions against the blades of the wheel or fan, and thereby give rotary motion thereto. In this lower part of the case of the measuring chamber is also formed a regulating hole at right angles thereto, through which a current of water passes in a line direct towards the axis of the fan or wheel.

The stream passing through this regulating hole may be regulated in force by means of a screw, the end of which is opposite the hole. Thus, by regulating the force of water passing though the hole, the action of the meter may be regulated without the risk of injury to the fan or wheel.

The case of the measuring chamber above the exterior flange is provided with a number of comparatively large holes to permit the liquid to pass out therefrom into the upper part of the lower case, whence it passes away by the outlet.

The axis of the fan or wheel has formed or fixed thereon a pinion which gives motion to a toothed wheel, on the axis of which is another pinion giving motion to a toothed wheel, on the axis of which is fixed a magnet. This train of gearing is enclosed by a thin casing, which, although not water-tight, prevents the current of water entering and leaving the meter from interfering with the motion of the gearing.

The magnet acts upon a piece of soft iron, fixed on the axis of the first counting wheel, and so communicates motion to the counting apparatus without being otherwise connected thereto.

2710.—Morgan-Brown, W., Southampton Buildings, London, "*A new and improved automatic gas-lighter.*" A communication. Patent dated July 14, 1877.

This invention consists in the combination with a gas-burner and with its supply cock of a cam which controls a mechanism for opening and closing the supply cock, and also a mechanism for lighting the gas when the supply cock has been opened, the cam being connected to a clock movement, so that by setting the clock, the time for lighting and extinguishing the gas can be adjusted in advance.

It further consists in an automatic winding device, whereby the spring or weights which actuate the clock movement are, by means of a supplemental weight or spring of greater capacity, at fixed intervals re-wound; so that until the force of such supplemental weight or spring is exhausted, the smaller weight or spring by which the clock movement is directly impelled will have their operative force replenished by the superior weight or spring.

And it further consists in the combination of two discs or indices, one of which has a motion independent of the other, and a shaft which is provided with a tooth to impart a step-by-step motion to a gear wheel which connects by an eccentric wrist pin and a pitman rod, or its equivalent, with the moveable disc or index, either the shaft or the disc or the indices being made to revolve, so that an irregular step-by-step motion is imparted to the moveable disc or index, whereby a new mechanical movement is produced, which, when connected and combined with the clock movement that automatically lights the gas at the hour to which it may be adjusted, will so vary the period of lighting (by adjusting such automatic lighting mechanism) from day to day throughout the year, so that such moment of lighting or extinguishing the gas shall conform to the varying lengths of day and night throughout the year.

APPLICATIONS FOR LETTERS PATENT.

3639.—Parkinson, G. J., Balsall Heath, Worcester, "Improvements in gas-burner regulators." Sept. 16, 1878.

3693.—Gwynne, J., Hammersmith, "Improvements in centrifugal pumps." Sept. 19, 1878.

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1096.—Lake, W. R., Southampton Buildings, London, "Improved apparatus to be connected with the stopcocks of gas-pipes for opening and closing the same." A communication. March 19, 1878.

1105.—Lake, W. R., Southampton Buildings, London, "Improvements in water-meters." A communication. March 20, 1878.

1219.—Kirkham, T. N., Westminster, and Chandler, S., Newington Causeway, London, "Improvements in apparatus used in the manufacture of gas." March 28, 1878.

1243.—Cutler, S., Millwall, London, "Improvements in valves." March 29, 1878.

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1306.—Hulett, D., High Holborn, Kirkham, T. N., Westminster, and Chandler, S. and J., Newington Causeway, London, "Improvements in apparatus used in the manufacture of gas." April 3, 1878.

1511.—Waldron, E., London Road, London, "New or improved rotary pumps or engines applicable for transmitting power, and for compressing or exhausting air or gas, and also applicable as a liquid or fluid meter." April 16, 1878.

2069.—Ripley, R. S., Strand, London, "Improvements in the process and apparatus for the manufacture of gas for heating and other purposes." A communication. May 23, 1878.

2683.—Foulis, W., Glasgow, "New or improved apparatus for governing the flow and pressure of water and other liquids." July 5, 1878.

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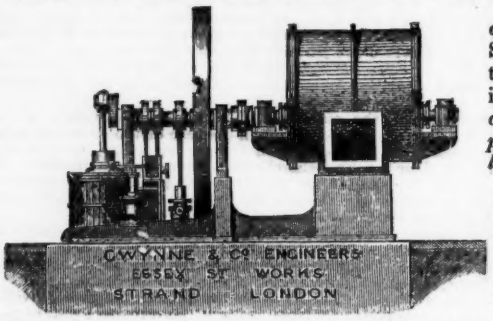
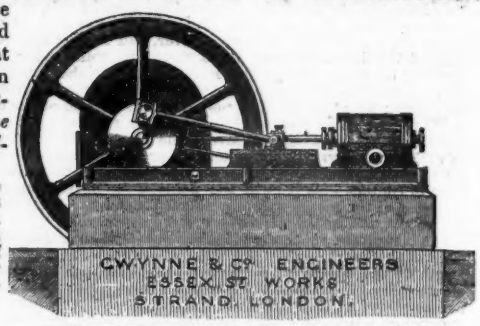


EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



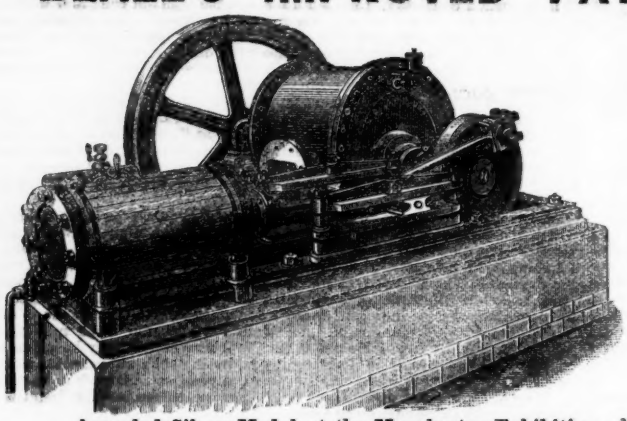
52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.
Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS



WITH

Wrought-Iron Spindles and

ENGINES COMBINED.

SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:
HOLLAND STREET, SOUTHWARK, S.E.

Now Ready, price 28s., handsomely bound in Morocco, cloth sides, gilt edged and lettered,

THE FIRST VOLUME
OF
KING'S TREATISE
ON THE
SCIENCE AND PRACTICE OF THE MANUFACTURE & DISTRIBUTION
OF
COAL GAS.

EDITED BY THOS. NEWBIGGING, C.E., M. INST. C.E., AND W. T. FEWTRELL, F.C.S.

This Volume contains 460 pages of Letterpress, and is illustrated by 521 Woodcuts and 36 page and double-page Engravings, printed on Plate paper, and a full-page

COLOURED ENGRAVING OF THE BECKTON GAS-WORKS,
Forming a Frontispiece to the Volume.

ORDERS RECEIVED BY THE PUBLISHER,
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS holding, previous to the 30th of June last, £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 2nd of October, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, and on other business.

The Transfer Books will be closed on and after the 11th of September, and opened on the 3rd of October.

By order of the Court of Directors,
ISAAC ADOLPHUS CROOKENDEN, Secretary.
70, Bankside, London, S.E., Aug. 29, 1878.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by the Advertiser, an appointment as METER INSPECTOR, &c. Over nine years experience in London.
Address G. W. B., Dee Villa, Wells Road, SYDENHAM, S.E.

TAR STILL MAN.

WANTED, by the British Gas Company, Limited, an Experienced MAN to Work their Tar Stills. None need apply unless those who can produce certificates for experience, sobriety, and steadiness.
Apply, stating wages, to ANDREW DOUGALL, Engineer, HULL.

WANTED, a Situation as Manager or WORKING FOREMAN of small Gas-Works. Thoroughly understands Meter Fixing, Service Laying, and general routine of Gas-Works. Good character.
Address W. R., Gas-Works, Middleham, Bedale, YORKSHIRE.

METER REPAIRER.

WANTED, at the Reading Gas-Works, a METER REPAIRER. Principally on Dry Meters. To a steady and good workman, 36s. per week is offered.
Apply at once, with character or reference, to Mr. BAKER, Engineer.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

SMITH and Pipe-fitter, aged 25, wants a Situation; used to Gas and Water Engineers work. Two years in last place. Has had charge of men. No objection to go abroad.
Address A. S., 49, Bedford Street, WALWORTH ROAD.

PUPIL.

GAS Engineer has a vacancy for a well-educated Youth.
For terms and further particulars, apply, by letter, to No. 493, care of Mr. King, 11, Bolt Court, Fleet Street, LONDON, E.C.

ASSISTANT, well up in the Designing, Construction, and Erection of the most improved Gas Plant, Buildings, Roofs, Girders, Steam, Hydraulic and General Machinery, is open to an appointment. First-class references.
Address HOWARD LANE, Birmingham Corporation Gas-Works, SALTLEY.

TAR AND LIQUOR CONTRACT.

THE Directors of the Gloucester Gas Company invite TENDERS for the Surplus TAR and LIQUOR produced at their Works.
Particulars on application to the undersigned.
Tenders to be sent in not later than the 30th inst., addressed to me.
R. MORLAND, Engineer and Manager.
Gloucester, Sept. 13, 1878.

ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.
For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

STATION-METER FOR SALE.

THE Gas Committee of the Rochdale Corporation offer for SALE a STATION-METER, capacity 25,000 cubic feet per hour, 12-in. Connections, Hydraulic Valves, and Bye-Pass, and all other necessary fittings. The Meter to be removed in consequence of extensions.
Any further information thereon can be had from the Manager at the Works.
Tenders, endorsed "Tender for Station-Meter," must be sent to me on or before the 13th inst.
By order,
ZACH. MELLOR, Town Clerk.
Town Hall, Rochdale, Aug. 2, 1878.

GLASGOW CORPORATION GAS.

RESIDUAL PRODUCTS FOR SALE.

THE Glasgow Corporation are prepared to receive TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR produced at the Dalmarnock Gas-Works from and after Sept. 1, 1879. The contract to be for such number of years as may be agreed upon.
Forms of tender, on which offers must be made, may be had, and further particulars obtained, on application to the Manager, at the Gas Office, 42, Virginia Street, Glasgow; and offers, endorsed "Tender for Residual Products," will be received by the subscriber up till Saturday, the 26th of October next.
Suitable ground for the erection of Chemical Works may be acquired in the immediate neighbourhood of the Gas-Works.
The Corporation do not bind themselves to accept the highest or any tender.
J. D. MARWICK, Town Clerk.
City Chambers, Glasgow, Sept. 3, 1878.

TENDERS FOR TAR.

THE Pittenweem Gaslight Company invite TENDERS up to the 13th of October next for their Surplus TAR LIQUOR, per ton for Three years from the 1st of November next. Delivery on rail or at Company's works, filled into purchaser's vessels.
Address THOS. NICOLSON, Secretary, Pittenweem, FIFE, N.B.

AMMONIACAL LIQUOR.

THE Gas Committee of the Borough of Doncaster are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at their Works, for a period of One, Two, or Three years, commencing Oct. 1, 1878.
Particulars may be obtained on application to Mr. R. Bridge, Engineer, Gas-Works, Doncaster.
Tenders to be delivered not later than Thursday, the 26th of September, addressed to the Chairman of the Gas Committee, endorsed "Tender for Ammoniacal Liquor."
WILLIAM DUNHILL, Chairman.
Gas-Works, Doncaster, Sept. 17, 1878.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to
FRANK M'GEDY, Secretary.
126, Chancery Lane, London.

TO IRONFOUNDERS AND PIPE CASTERS.

THE Watford Local Board of Health are prepared to receive TENDERS for about 600 twelve-in. vertically-cast IRON PIPES, with Branch-Pipes, Flange-Pipes, &c.
Specification and schedule can be seen, and forms of tender obtained, on and after Monday, the 23rd of September, on application to Mr. C. C. Lovejoy, Surveyor to the Board, at the Local Board Water-Works, Watford, Herts, between the hours of Ten a.m. and Four p.m.
Tenders, on the printed form, must be delivered to me not later than Seven p.m. at my Office, No. 66, High Street, Watford, on Thursday, Oct. 3.
The Board do not bind themselves to accept any tender.
JOHN SEDGWICK, Clerk to the Board.

EXMOUTH GAS-WORKS.

THE Directors of the Exmouth Gas Company invite TENDERS for the Purchase of their Surplus TAR and AMMONIACAL LIQUOR produced at the above Works, for a term of One or Two years. The Contractor will have to pay all expenses of carriage, and keep Directors provided with a sufficient stock of sound casks.
The quantity of coal carbonized is about 1000 tons a year.
Terms, cash quarterly.
Sealed tenders, endorsed "Tender for Tar and Liquor," to be sent to the Secretary, Gas-Works, Exmouth.
The Directors do not bind themselves to accept the highest or any tender.
Sept. 13, 1878.

THE Directors of the Horsham Gas Company, Limited, invite TENDERS for their Surplus TAR and AMMONIACAL LIQUOR from Michaelmas, 1878, to Michaelmas, 1879.
The purchaser to provide barrels when required, and to pay all railway charges.
The Company to pay all charges between their works and the Horsham Railway Station.
The quantity for disposal is expected to be about 400 barrels of Tar, and 200 of Liquor, not weaker than 4° Twad.
Tenders to state the price offered per American oil barrel, not exceeding 40 gallons.
Payment to be made quarterly.
Sealed tenders, endorsed "Tender," to be sent to the undersigned on or before the 28th inst.
ROBT. SHEPPARD, Secretary.

TO TAR DISTILLERS AND OTHERS.

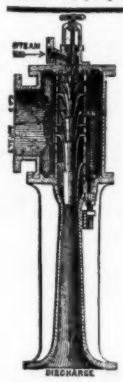
THE Directors of The Gaslight and Coke Company require the services of a duly qualified person as MANAGER of their Tar-Works at Beckton, under the supervision of the Resident Engineer of the Station.
He must possess a knowledge of Chemistry, and be thoroughly acquainted with all the details of the Distillation of Tar, and also be able, if required, to Design and Superintend any addition to the Works which may become necessary.
Salary £500 per annum.
Applications, in writing, accompanied by testimonials, stating age and experience, should be addressed to me on or before Thursday, the 10th of October.
By order,
JOHN ORWELL PHILLIPS, Secretary.
Chief Office, Horseferry Road, Westminster,
Sept. 20, 1878.

GAS AND WATER WORKS MANAGER AND CLERK WANTED.

THE Brighouse Local Board require the services of a competent Person to undertake the duties of MANAGER of the Brighouse Gas-Works and Water-Works, and to act as CLERK to the Local Board. He must have a good knowledge of the Manufacture and Distribution of Gas. The present make is about 30 million cubic feet per annum. Any candidate appointed will be required to devote the whole of his time to the discharge of his duties, and give a bond in £500, with sureties to be approved by the Local Board.
Any further information respecting the duties of the Office may be had on application at the Gas-Works, Brighouse.
Applications, endorsed "Gas Manager," stating age, qualifications, salary required, and the time at which the applicant can enter upon his duties, together with recent testimonials, to be addressed to the Chairman of the Local Board, Gas-Works, Brighouse, on or before Thursday, the 3rd of October next.
By order,
JAMES RILEY, Clerk to the Local Board.
Offices of the Local Board, Gas-Works,
Brighouse, Sept. 20, 1878.

TO IRONFOUNDERS AND OTHERS.

THE Corporation of the Borough of Dewsbury hereby invite TENDERS for the following articles, together or separately, which have been in use at their Batley Carr Gas-Works, viz.:—
Six-horse power Vertical Engine, made by J. Metcalfe, Bradford.
Four-horse power Vertical Engine.
Tangye's "Special" Steam-Pump.
Boiler, 11 ft. long by 4 ft. diameter, with Safety Valve, &c.
Boiler, 11 ft. long by 3 ft. diameter, with Safety Valve, Steam-Gauge, Water Gauge, &c.
Waggon Boiler, been used for storeage of Tar.
Mortar Mill, 4 ft. 6 in. Pan, 2 ft. 6 in. Rollers, two Pedestals, one Hanger, three Drums and Shafting.
Cast-Iron Annular Condenser, twelve Columns of Pipes, Outer Pipe 24 in. diameter. Bottom box 30 ft. 6 in. by 2 in. 6 in. by 2 ft. deep.
Cast-Iron Pipe Condenser, 30 Columns of Pipes, 10 ft. diameter. Bottom Box 23 ft. by 3 ft. by 1 ft. 6 in. deep.
Telescopic Gasholder, 74 ft. diameter, in two lifts, each 18 ft. deep, with Columns, Guides, Girders, Chains, Balance-Weights, &c.
Cast Iron Tank, 76 ft. diameter by 18 ft. 4 in. deep.
Two Cast-Iron Purifiers, 14 ft. 9 in. square, together with Covers, One 16-in. Dry Centre Valve, Lifting Apparatus, &c.
Large quantity of Old Iron, comprising Cast-Iron Hydraulic Mains and Stands, Retort Mouthpieces, Ascension-Pipes, Bridge-Pipes, Furnace Doors and Frames, Grate Bars, Sight-Hole Boxes, old Wrought-Iron Purifier Covers, and other old metal.
The Corporation do not bind themselves to accept the highest or any tender.
Sealed Tenders, endorsed "Tender for ——" as the case may be, to be sent to Jesse Smith, Esq., Town Clerk, Dewsbury, not later than Noon of Wednesday, Oct. 2, 1878.
Further particulars may be had on application to CHAS. ARMITAGE, Engineer and Manager, Gas-Works, DEWSBURY.



KÖRTING'S STEAM-JET EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 300 IN USE.

CLELAND'S SLOW-SPEED CONDENSER & STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

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OR TO

GERALD J. TUPP, 8, John Street, Adelphi, W.C.,

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SOLE AGENT FOR ENGLAND AND WALES.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

REDUCTION
OF
"UNACCOUNTED-FOR GAS."

Of the three essential conditions for this purpose—sound pipes, accurate measurement, and well-regulated pressure—the last two are covered by the following Patents held by our firm, viz.:—

THE WARNER & COWAN METER,
THE FOULIS STATION AND DISTRICT GOVERNOR.

The former is the ONLY THOROUGHLY RELIABLE METER IN EXISTENCE, being practically unvarying in capacity under all changes of water-line, and entirely free from any "compensating" or other extraneous mechanism.

The FOULIS GOVERNOR is, for its purpose, equally simple and efficacious, while it is the smallest, most compact, and cheapest Governor yet constructed. It may be placed underground anywhere in the line of main, and covered over just as an ordinary syphon, and yet be under entire control, with a delicacy of action and simplicity hitherto unequalled.

The combined use of these inventions will materially assist in the important work now so generally carried on for the reduction of the

"UNACCOUNTED-FOR GAS."

W. & B. COWAN,

(ESTABLISHED 1827,)

ORIGINAL LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S SELF-REGULATING GAS-METERS,

SOLE LICENSEES AND MANUFACTURERS OF

FOULIS'S STATION, DISTRICT, DIFFERENTIAL, & DRY GOVERNORS, LAMP-REGULATORS & AUTOMATIC LAMP-LIGHTERS,

CHURCH STREET, MILLBANK STREET, **LONDON, S.W.**	DUTTON STREET, NEW BRIDGE STREET, **MANCHESTER.**	BUCCLEUCH STREET WORKS, **EDINBURGH.**

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer,

CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

BEST GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

GAS-FITTERS TOOLS.

CRAMPTON BROTHERS

MANUFACTURES AND SPECIALITIES,

SHEFFIELD.

Screw Stocks, Taps and Dies, Tube Wrenches,
Tube Cutters, Tube Vices, Tongs and Pliers, Ratchet Braces,
Staple and Parallel Vices, Vice-Benches, &c.

ESTABLISHED 1866.

THE BUENOS AYRES GAS COMPANY, Louis Wilde, Agent, 42, South John Street, Liverpool.

This Agency has been removed from 4, Cable Street, to above address.

N.B.—The above-named is the Original Company, and has no connection with the Buenos Ayres Gas Company, LIMITED.

RIO DE JANEIRO GAS COMPANY, LIMITED.

The Shareholders are informed that the TRANSFER BOOKS will be CLOSED from the 20th to the 30th inst., both days inclusive.

By order,
Thomas Dawson, Secretary.

No. 1, Gresham House, Old Broad Street,
London, E.C., Sept. 16, 1878.

SULPHATE OF AMMONIA PLANT.

THE Newest, Best, and Cheapest Plant for Making SULPHATE of AMMONIA. Plans may be obtained for the erection of this economical and efficient apparatus, or tracings of plans with specifications. Terms moderate.

Address John G. Harvey, Little Island, Cork.

HENRY LYON (14 years Engineer and Manager of the largest of the Manchester Corporation Gas-Works) Mechanical and Consulting Gas Engineer, reports upon the condition and value of Gas-Works, supplies plans and specifications of all Apparatus appertaining to Gas-Works, and re-models existing Works.

Address Brooklyn, near Halliwell Lane, Cheetham Hill Road, Manchester.

Mr. ROBERT DEMPSTER, Sen.,

CONSULTING GAS ENGINEER,

Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

SULPHATE AMMONIA.

R. W. WALLACE & CO.,

60, MARK LANE, LONDON, E.C.,

Are Buyers of SULPHATE AMMONIA in Large or Small Quantities, or Sell on Commission for Gas Companies and Makers.

PLANT ERECTED ON THE LATEST AND MOST APPROVED PRINCIPLE.

AGENTS to THE GASLIGHT AND COKE COMPANY, LONDON, for the SALE of SULPHATE AMMONIA. Works: BECKTON.

AND PARLIAMENTARY APPLICATIONS CONDUCTED

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

MR. EDWARD SANDELL,
Associate of the Society of Accountants in England,
Publisher of the
"Gas Companies Expenditure Journal,"
Begs to announce his REMOVAL from Skinner's Place, Size Lane, to
No. 2, ST. GEORGE STREET, WESTMINSTER.

W. LIDDALL,
Public Accountant,
15, UNION COURT,
OLD BROAD STREET, E.C.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.
Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

YEO'S PATENT ENGINE PACKING,
Price 1s. 8d. per lb., any size.
Tarred & White Spun Yarn for Pipe Joints, at various prices.
Samples and testimonials free per post.
E. YEO, NEWTON ABBOT.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

TO ENGINEERS & MANAGERS.—CLIFTON'S
PATENT COKE AND COAL BARROW
Is acknowledged to be the best Barrow in the Market.
For particulars, with Drawings and Prices, apply to the Sole Makers,
THORNELOE & COMPANY,
ENGINEERS AND CONTRACTORS,
57, BARBICAN, LONDON, E.C.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.
BRANCH WORKS, BLACKBURN.
BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

JOHN SPENCER,
VULCAN WORKS, WEST BROMWICH, & 97, CANNON ST., LONDON,
Manufacturer of Every Description of
TUBES & FITTINGS,
Plant, Tools, Stores, and all requisites for Gas and Water Works: Gasholders, Purifiers, Scrubbers, Roofing, Sashes, Retort Fittings, Grids, Socket-Pipes, Lamp-Posts, Wheelbarrows; Brasswork, Chandeliers, and Gas-Fitters Tools; Liquor-Pumps, Valves; Clay Retorts and Fire Goods, &c.

HEBBURN MAIN GAS COALS.
T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,534 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."
PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.
THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

COMMERCIAL GLASS WORKS, 27, WELLCLOSE SQUARE, LONDON, E.
CHEAPEST HOUSE IN THE TRADE
FOR
GAS GLASSES OF EVERY DESCRIPTION.
Write for Lists, free on application to any part of the World.

THE THAMES BANK IRON COMPANY,
(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.
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GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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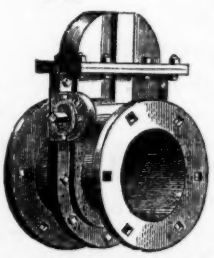
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.
STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS.
TRADE MARK.



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These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.
In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS,
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IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
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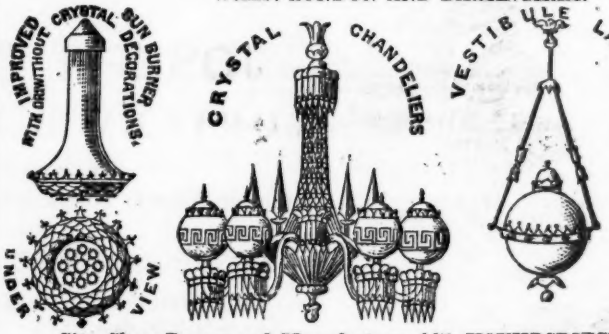

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In Silver and Glass;
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Of every description.
Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.
City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
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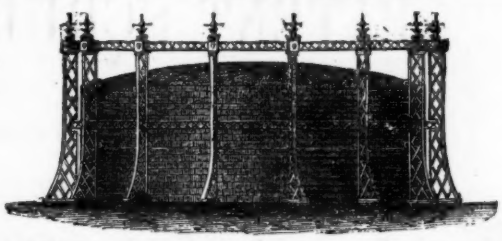

THE HORSELEY COMPANY,

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PUMPING MACHINERY of every Description.

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More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

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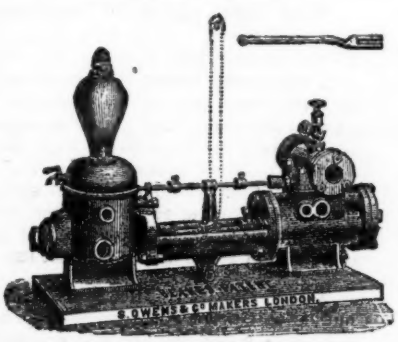

It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

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Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

Of every kind.

The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture.

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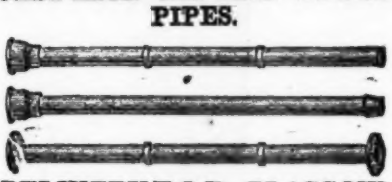

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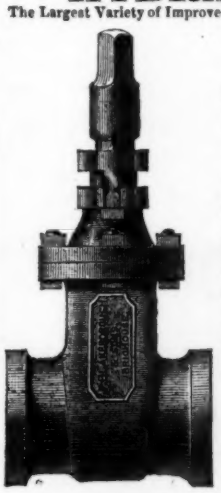

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Tested with 600 to 1000 feet head of pressure.

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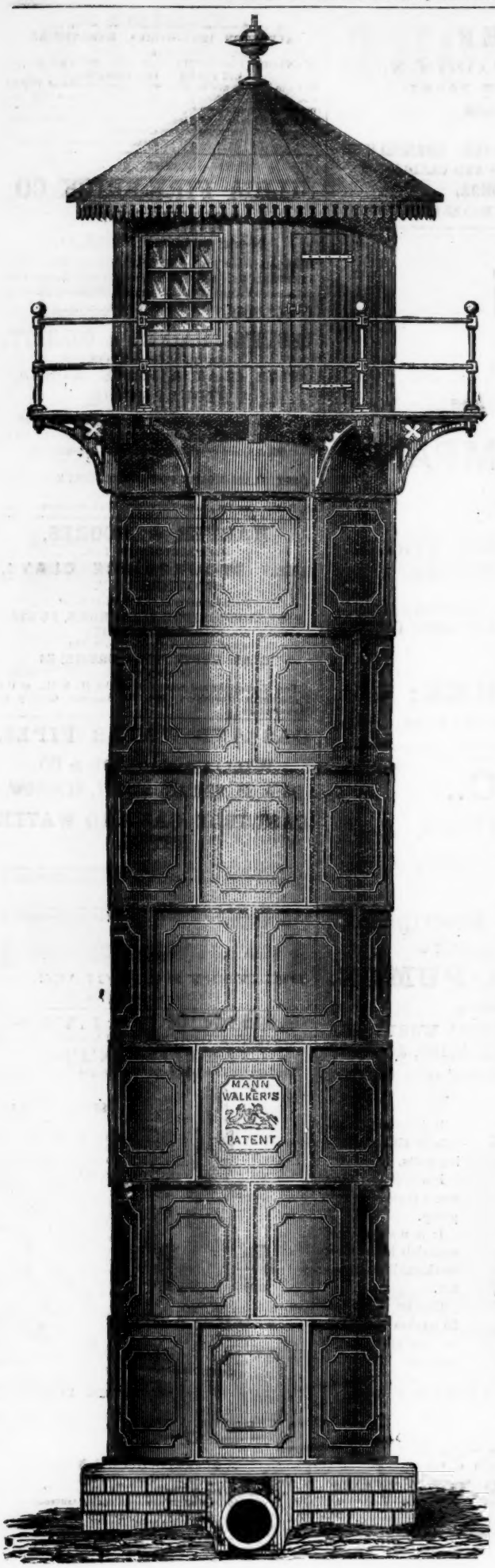
Where Samples may be seen.



C. & W. WALKER,
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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

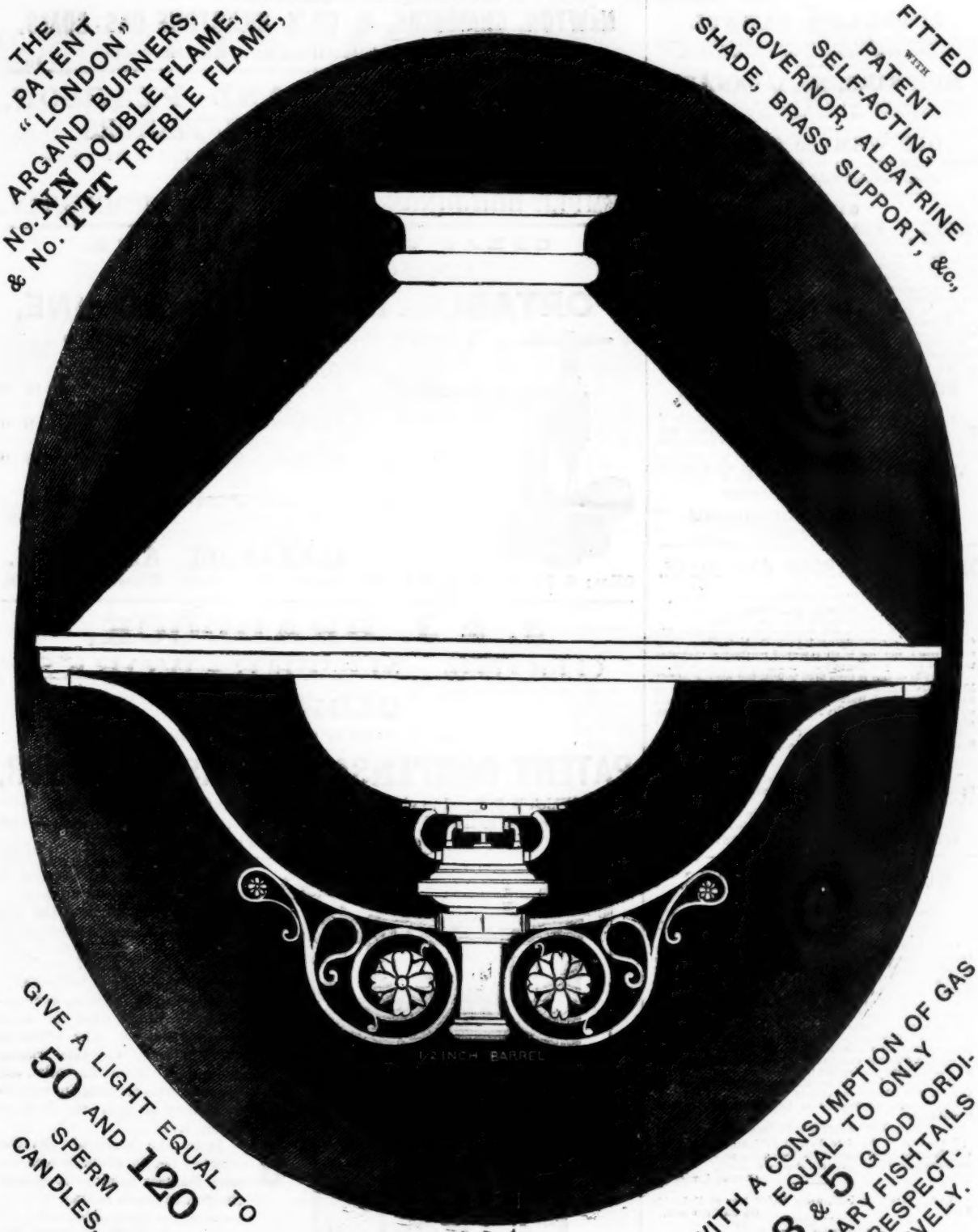
Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours or a winter's day, and the smallest make on a summer's day, to be purified.

POWERFUL LIGHT CENTRE.

NEAREST APPROACH TO DAYLIGHT.

THE PATENT "LONDON" ARGAND BURNERS, No. **NN** DOUBLE FLAME, & No. **TTT** TREBLE FLAME,

FITTED WITH PATENT SELF-ACTING GOVERNOR, ALBATRINE SHADE, BRASS SUPPORT, &c.,



GIVE A LIGHT EQUAL TO **50** AND **120** SPERM CANDLES,

WITH A CONSUMPTION OF GAS EQUAL TO ONLY **3** & **5** GOOD ORDINARY FISHTAILS RESPECTIVELY.

PILLAR LIGHT, fitted with either No. NN or TTT Patent "London" Argand Burner,

May be also fitted as a SUSPENSION LIGHT for Large Rooms.

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GAS ENGINEER, VINCENT WORKS, WESTMINSTER.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

DEAN'S PRIMROSE GAS COALS.

South Metropolitan Gaslight and Coke Company, London, July 12, 1878.

The Owners of the Dean's Primrose Colliery.

Dear Sirs,—I have much pleasure in stating that this Company have regularly used your Coals for more than thirty years, and that in all essential particulars they give the most satisfactory results.

The yield of Gas is from 9700 to 9800 feet per ton, of full 16 candles illuminating power, tested by the London Referees Standard Burner; and the Coke is of very good quality, while the quantity is about 40 bushels to the ton of Coal.

I consider Dean's Primrose Coals to rank amongst the first-class Gas Coals from the Durham Coal-Field.

Yours truly, GEORGE LIVESEY.

These Coals are also used by The Gaslight and Coke Company (London), and other English and Foreign Gas Companies.

Steamers loaded with quick despatch in the River Tyne. Price and other terms on application at the

FITTING OFFICE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company, 589, *Old Kent Road, London, S.E., Oct.* 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

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M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.

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AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

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Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

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GREAT SAVING OF LABOUR.

ENOCH'S PATENT

PORTABLE DRILLING-MACHINE,

Now in use by all the Principal Gas and Water Companies in the United Kingdom.

E Size, for Services in Pipes, 2 to 3 in. bore	£3 10 0
F Size, for Services in Pipes, 2 to 4 in. bore	4 0 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp.	4 10 0

Drills, 1s. 6d. each.

Machines sent on approval, if desired.

Prices for other Sizes and Modifications, with full Particulars and Testimonials, on application to

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Office: 9, London Street, E.C. Warehouse: Vine Street, Minories, London, E.

J. & J. BRADDOCK,

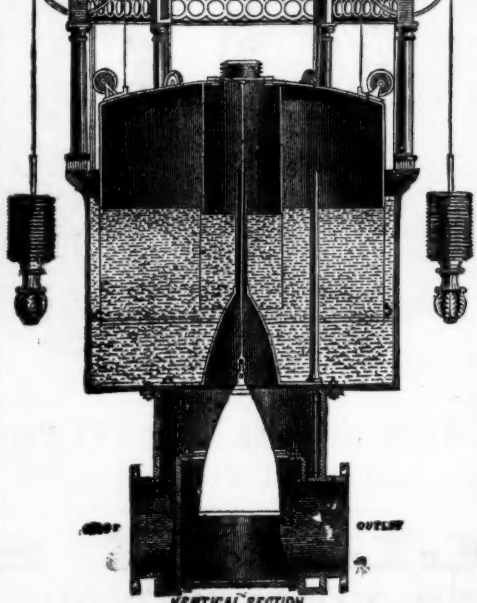
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

RICH. H. TAUNTON & HAYWARD,

MANUFACTURERS OF

WROUGHT-IRON GAS, WATER, & STEAM TUBES & FITTINGS,

STAR TUBE WORKS, HENEAGE STREET, BIRMINGHAM.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms, and to treat, by Purchase or Exchange, for Spent Oxide.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.

LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

For Particulars and Prices apply to

Messrs. DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;
Messrs. BAILEY, PEGG, AND CO., Bankside, LONDON, S.E., for the South;
Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;
Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

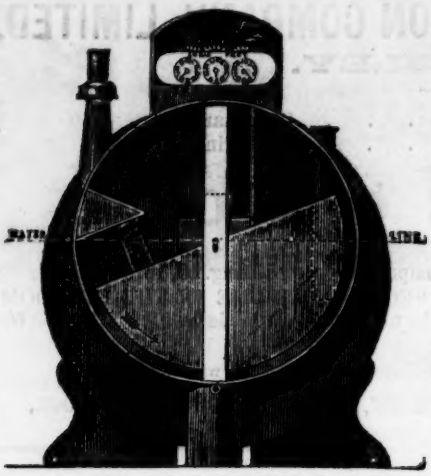
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of [illegible] yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. [illegible] the samples bear a close relation to each

PATERSON."

RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.



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UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 120,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,

KINGSLAND ROAD, LONDON;

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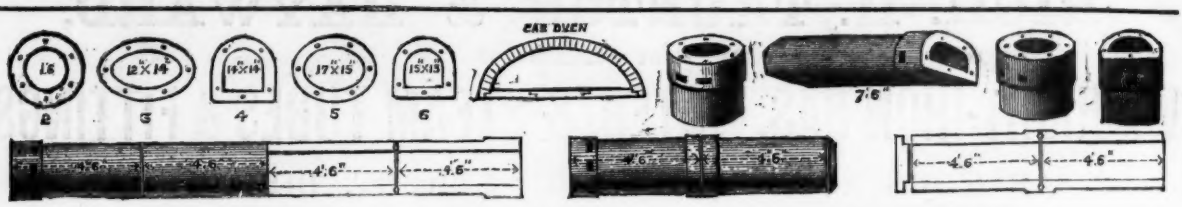
Branch Manufactories at DUBLIN and OLDHAM.



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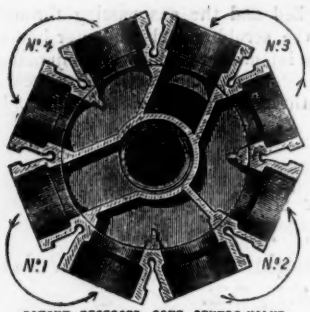

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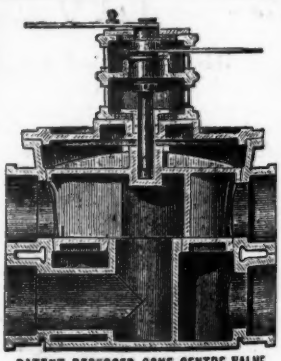

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